

# EXHIBIT 3

**Evaluating Performance of the  
AERMOD/AERMET v. 12345 Beta Options**

**Prepared by:**

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**ATTACHMENTS**

1. Quantile-Quantile Plots for Baldwin EGU Evaluation
2. Quantile-Quantile Plots for Kincaid EGU Evaluation
3. Quantile-Quantile Plots for Lovett EGU Evaluation
4. Quantile-Quantile Plots for Tracy EGU Evaluation
5. Quantile-Quantile Plots for Prairie Grass Tracer Evaluation
6. Homer City, PA EGU One-hour SO<sub>2</sub> Impacts

## **1. Executive Summary**

This document presents five field study evaluations of AERMOD v. 12345. The five field study evaluations include four tall-stack EGU evaluation databases and one low-level, non-buoyant release study.

The primary purpose of these evaluations is to determine whether the non-default beta options included in AERMOD v. 12345 improve or degrade performance compared to the regulatory default options. These model evaluations result in the following conclusions:

- For the four AERMOD EGU evaluation studies analyzed here, v. 12345 beta options decrease model performance and increase variability of impacts.
- For the non-buoyant low-level Prairie Grass tracer release, the v. 12345 beta options decrease model performance and increase variability of impacts.

Based on the five field studies included in this analysis, the non-default beta options do not improve model performance; instead they tend to decrease model performance and introduce new performance problems. AERMOD has been extensively evaluated and the non-default beta options do not appear to be necessary.

This report also includes an analysis of SO<sub>2</sub> emissions from the Homer City, Pennsylvania coal-fired power plant. The AERMOD v. 12345 non-default beta options tend to increase modeled impacts, compared to the “off-the-shelf” version of AERMOD. Furthermore, the non-default beta options introduce a wide-range of potential impacts for the same meteorological data and emission inputs. This variability in modeled impacts will complicate regulatory decision making and will likely encourage “model shopping” to influence predicted impacts.

## **2. Introduction**

In December 2012, USEPA released revised versions of the AERMOD air dispersion model and AERMET, the meteorological data processor for AERMOD. These programs are known as AERMOD v. 12345 and AERMET v. 12345, as they were released on Julian day 345 of 2012.

Version 12345 of AERMOD includes non-default beta options to study the effect of varying minimum values of the standard deviation of the horizontal wind speed fluctuations ( $\sigma_v$ ) and wind speed (WS). This version of AERMOD also includes the non-default beta option for varying the maximum meander component (FRANmax).

Version 12345 of AERMET includes the non-default beta option to adjust the calculated friction velocity under low wind speed and stable conditions (ADJ\_U\*).

In summary, the non-default beta options are:

LOWWIND1:

- Minimum  $\sigma_v$  can be set from 0.01 to 1.0 m/s
- Minimum WS can be set from 0.01 to 1.0 m/s
- No horizontal meander component is included

LOWWIND2:

- Minimum  $\sigma_v$  can be set from 0.01 to 1.0 m/s
- Minimum WS can be set from 0.01 to 1.0 m/s
- FRANmax can be set from 0.5 to 1.0

AERMET ADJ\_U\*:

- Adjusts the calculated friction velocity under low wind speed and stable conditions

Numerous combinations of these non-default beta options can also be assessed.

These non-default beta options have the potential to result in a wide-range of modeled impacts that may differ substantially from “off-the-shelf” versions of AERMOD v. 12345 and AERMET v. 12345. This situation will likely result in “model-shopping,” which can be described as using the model option that most favors the result desired by the entity performing the modeling.

### **3. USEPA 2003 AERMOD Evaluations**

USEPA prepared detailed performance evaluations prior to the release of AERMOD.<sup>1</sup> USEPA’s evaluations included 17 different field studies. Using these 17 field studies, USEPA showed that AERMOD closely predicted monitored impacts based on the robust highest concentration (RHC) statistical method. The RHC is useful for determining whether modeled predictions are accurately reflecting the highest concentrations that will be used for verifying compliance with regulatory

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<sup>1</sup> USEPA, AERMOD: Latest Features and Evaluation Results, EPA-453/R-03-003, June 2003.

design concentrations (typically NAAQS or PSD increments). USEPA's evaluations were performed using AERMOD v. 02222.

The RHC "represents a smoothed estimate of the highest concentrations, based on a tail exponential fit to the upper end of the concentration distribution."<sup>2</sup> The RHC is calculated as follows

$$\text{RHC} = \chi(n) + (\chi_{\text{ave}} - \chi(n)) * \ln((3n-1)/2),$$

Where:

- $n = \min(m_0, m)$ ;  $m_0$  is the number of values used to characterize the upper end of the concentration distribution,  $m$  is the number of values exceeding a specified threshold value
- $n = 26$  for AERMOD evaluations
- $\chi(n) = n^{\text{th}}$  largest value
- $\chi_{\text{ave}} = \text{average of the } n-1 \text{ largest values}$

The RHC is an appropriate analysis of AERMOD's utility and applicability. Any evaluation study is limited by the number of available monitors and the duration that the monitoring occurs. Using unpaired modeling and monitoring results ensures that the evaluation assesses the highest concentrations necessary for verifying compliance with regulatory design concentrations. From Cox and Tikvart:

Because of the nature of some ambient standards, such as those for SO<sub>2</sub>, models must accurately predict the highest 3-h or 24-h average concentration independent of exactly when or where they may occur.<sup>3</sup>

In addition, by using unpaired modeling and monitoring results, the RHC is not overly influenced by uncertainties in measured wind speed, wind direction, stability parameters, emission rates, and release parameters. Any uncertainty in these model inputs will result in decreased model performance, particularly when trying to replicate measured impacts at a specific location and time. From the Guideline on Air Quality Models:

As noted above, poor correlations between paired concentrations at fixed stations may be due to "reducible" uncertainties in knowledge of the precise plume location and to unquantified inherent uncertainties. For example, Pasquill estimates that, apart from data input errors, maximum ground-level concentrations at a given hour for a point source in flat terrain could be in error by 50 percent due to these uncertainties. Uncertainty of five to 10 degrees in the measured wind direction, which transports the plume, can result in concentration errors of 20 to 70 percent for a particular time and

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<sup>2</sup> Id., p. 14.

<sup>3</sup> Cox, W. and Tikvart, J., A Statistical Procedure for Determining the Best Performing Air Quality Simulation Model. Atmospheric Environment, 1990, 24A: 2387-2388.

location, depending on stability and station location. Such uncertainties do not indicate that an estimated concentration does not occur, only that the precise time and locations are in doubt.<sup>4</sup>

Consistent with the Guideline on Air Quality Models, RHCs are an effective and accurate way to evaluate model performance.

For each field study, an RHC is calculated for both the modeled impacts and the monitoring results collected during the study. The ratio of the modeled RHC to the monitored RHC represents how well the model predicted the field study monitoring results.

Model performance can also be demonstrated using Quantile-Quantile (Q-Q) plots, which are line graphs of modeled concentrations versus predicted impacts. The Q-Q plots are based on the 26 highest modeled and monitored concentrations (applicable for regulatory design concentrations), and have the following characteristics:

- Concentrations are unpaired in space and time
- Predicted concentrations represent highest modeled impact across all receptors (monitor locations) for each data period – same as RANKFILE
- Observed concentrations represent highest impact across all monitors for each data period
- Model performance decreases as values move away from the middle 1:1 line

#### 4. AERMOD/AERMET v. 12345 Evaluations

The non-default beta options included in AERMOD/AERMET v. 12345 have the potential to change model performance when compared to the regulatory default options. Using the AERMOD evaluation databases provided in USEPA's SCRAM website, I evaluated model performance for the following AERMOD versions and options:

- AERMOD v. 02222 (the same version used in USEPA's 2003 AERMOD evaluation)
- AERMOD v. 12345 (off-the-shelf: no beta options)
- AERMOD v. 12345, beta LOWWIND1, SVmin = 0.5 m/s; WSmin = 0.5 m/s
- AERMOD v. 12345, beta LOWWIND2, SVmin = 0.3 m/s; WSmin = 0.5 m/s; FRANmax = 0.95
- AERMOD v. 12345, beta ADJ\_U\*

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<sup>4</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 9.1.2.b.

- AERMOD v. 12345, beta ADJ\_U\*, with LOWWIND1, SVmin = 0.5 m/s; WSmin = 0.5 m/s
- AERMOD v. 12345, beta ADJ\_U\*, with LOWWIND2, SVmin = 0.3 m/s; WSmin = 0.5 m/s; FRANmax = 0.95

The field studies I included in my evaluations are:

- Baldwin (1-hr SO<sub>2</sub>): Rural, flat terrain, 3 stacks, HS = 184.4 m
- Kincaid (1-hr SO<sub>2</sub>): Rural, flat terrain, 1 stack, HS = 187 m
- Lovett (1-hr SO<sub>2</sub>): Rural, complex terrain, 1 stack, HS = 145 m
- Tracy (1-hr SF<sub>6</sub>): Rural, complex terrain, 1 stack, HS = 90.95 m
- Prairie Grass (1-hr SF<sub>6</sub>): Rural, flat terrain, 1 stack, HS = 0.46 m (no plume rise)

The Baldwin, Kincaid, Lovett, and Tracy field studies are useful for assessing model performance of tall Electric Generating Unit (EGU) stacks. These field studies are particularly important since the preliminary evaluations used in developing the non-default beta options all used non-buoyant low-level releases. The LOWWIND1 and LOWWIND2 non-default beta options were evaluated by USEPA using the Idaho Falls and Oak Ridge field studies.<sup>5</sup> These studies are not likely to be applicable to tall-stack EGU emissions.

Furthermore, the AERMET v. 12345 non-default ADJ\_U\* beta option was developed based on results from the Prairie Grass and Idaho Falls field studies.<sup>6</sup> These studies are non-buoyant, low-level releases that do not reflect dispersion for tall EGU stacks.

The Prairie Grass SF<sub>6</sub> field study can be used to evaluate AERMOD non-default beta option performance for low-level releases of non-buoyant emissions.

## 5. Evaluation Methods and Results

I evaluated the default and non-default beta options of AERMOD and AERMET described above using five field studies (Baldwin, Kincaid, Lovett, Tracy, and Prairie Grass). The evaluation methods I used and the results I obtained are discussed below.<sup>7</sup>

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<sup>5</sup> USEPA, User's Guide for the AMS/EPA Regulatory Model – AERMOD, Addendum, Appendix F, Evaluation of Low Wind Beta Options, December, 2012.

<sup>6</sup> Qian, Wenjun and Akula Venkatram, Performance of Steady-State Dispersion Models Under Low Wind-Speed Conditions, Boundary Layer Meteorology, 2011, 138:475–491.

<sup>7</sup> It is important to note that my evaluations, although they used the evaluation field studies provided by USEPA (and the same equation for calculating RHC), did not always obtain precisely the same Modeled RHC/Monitored RHC values presented in USEPA's AERMOD: Latest Features and Evaluation Results, EPA-453/R-03-003, June 2003; minor

## **5.1 Meteorological data**

I used the AERMET v. 02222 meteorological data prepared by USEPA in my evaluation runs for AERMOD v. 02222. These data were provided in model-ready form on the USEPA SCRAM website.<sup>8</sup> I created AERMET v. 12345 meteorological data and AERMET v. 12345 non-default ADJ\_U\* meteorological data using AERMET v. 12345 and the pertinent input data and options.

The necessary meteorological data for the Prairie Grass field study were not provided with USEPA's evaluation database. I contacted USEPA, regarding these data. I did not receive a reply. To complete the Prairie Grass evaluation, I used 1956 ISH data for North Platte, Nebraska. I processed these data with AERMET v. 12345 using the same procedures as for the other evaluation databases.

## **5.2 Data Processing for RHC Calculations**

I formatted the observed concentrations and modeled concentrations to facilitate RHC calculations. For the observed concentrations, I determined the maximum concentration across all receptors for each data period. For the modeled concentrations, I wrote a utility program to read AERMOD postfile concentrations and write the output such that all receptor concentrations for each data period occupy one record. I then extracted the maximum concentration across all receptors for each data period, as I did for the observed concentrations.

I then isolated and sorted the 26-highest observed and modeled concentrations. From these values, I calculated modeled RHC and observed (monitored) RHC values as discussed above.

## **5.3 Summary of Evaluation Results**

A summary of Modeled RHC/Monitored RHC values for these modeled scenarios and field studies is presented in the following table:

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discrepancies in the results occur. I discussed these differences with Roger Brode, USEPA; however, the reason for the differences was not determined. Nonetheless, these discrepancies do not detract from the main conclusions of my evaluation.

<sup>8</sup> [http://www.epa.gov/ttn/scram/dispersion\\_prefrec.htm](http://www.epa.gov/ttn/scram/dispersion_prefrec.htm).

AERMOD version and options	Baldwin (1-hr SO <sub>2</sub> )	Kincaid (1-hr SO <sub>2</sub> )	Lovett (1-hr SO <sub>2</sub> )	Tracy (1-hr SF <sub>6</sub> )	Prairie Grass (1-hr SF <sub>6</sub> )
v. 02222	1.42	0.84	0.90	1.05	1.19
v. 12345	1.56	0.83	0.78	1.12	1.16
v. 12345, LOWWIND1, 0.5, 0.5	1.71	0.87	0.77	0.84	0.68
v. 12345, LOWWIND2, 0.3, 0.5, 0.95	1.58	0.76	0.69	0.90	0.95
v. 12345, ADJ_U*	1.56	0.83	0.85	0.74	1.18
v. 12345, ADJ_U*, LOWWIND1, 0.5, 0.5	1.71	0.87	0.77	0.53	0.68
v. 12345, ADJ_U*, LOWWIND2, 0.3, 0.5, 0.95	1.58	0.76	0.78	0.61	0.96

### 5.3.1 Baldwin Evaluation Results

All versions of AERMOD and options tended to over-predict observed RHC values. AERMOD v. 12345 non-default options tended to increase this over-prediction and decrease model performance. Q-Q plots for each modeled scenario are included in Attachment 1.

### 5.3.2 Kincaid Evaluation Results

All versions of AERMOD and options tended to under-predict observed RHC values. AERMOD v. 12345 non-default options tended to increase variability in modeled impacts with no discernible improvement in model performance. Q-Q plots for each modeled scenario are included in Attachment 2.

### 5.3.3 Lovett Evaluation Results

All versions of AERMOD and options tended to under-predict observed RHC values. AERMOD v. 12345 non-default options tended to increase variability in modeled impacts with no discernible improvement in model performance. Q-Q plots for each modeled scenario are included in Attachment 3.

### 5.3.4 Tracy Evaluation Results

AERMOD v. 12345 tended to slightly over-predict observed RHC values (modeled RHC/observed RHC = 1.12). AERMOD v. 12345 non-default options under-predict observed concentrations and decrease model performance. Q-Q plots for each modeled scenario are included in Attachment 4.

### 5.3.5 Prairie Grass Evaluation Results

AERMOD v. 12345 tended to slightly over-predict observed RHC values (modeled RHC/observed RHC = 1.16). AERMOD v. 12345 non-default options under-predict observed concentrations and decrease model performance, with the exception of v. 12345 with beta ADJ\_U\* meteorological data (modeled RHC/observed RHC = 1.18). The non-default beta options also result in a wide-range of modeled impacts. Q-Q plots for each modeled scenario are included in Attachment 5.

## 6. Homer City, PA EGU Analysis

I analyzed the one-hour SO<sub>2</sub> impacts from the Homer City, Pennsylvania EGU using AERMOD/AERMET v.12345 and the same non-default beta options described in the previous field study evaluations. The Homer City facility is located southwest of Homer City, Pennsylvania, and is about 3.8 km from the Homer Center High School. This analysis focuses on modeled impacts at the Homer Center High School.

The Homer City EGU consists of three tall stacks, ranging from 244 to 260 meters in height. In this analysis, I modeled allowable SO<sub>2</sub> emission rates using two different meteorological data sets. The first data set is from the Manor site for a one-year period during 1990-1991. This site-specific data set was provided by Pennsylvania Department of Environmental Protection. The second meteorological data set is from the Johnstown ASOS site (KJST) and covers the 2007-2011 five-year period. The KJST surface data includes one-minute ASOS winds which I processed with AERMINUTE. Using AERMET v. 12345, I merged the KJST surface data with KPIT upper air data for the same period.

The results of this analysis show that in most instances, the site-specific Manor meteorological data result in significantly higher impacts than the KJST/KPIT data set. This is not an unusual result. The non-default beta options introduce a wide variety of modeled impacts, with most of the options resulting in higher one-hour SO<sub>2</sub> impacts than the default version of AERMOD v. 12345. For the site-specific Manor meteorological data set, the LOWWIND1 non-default beta option results in up to 30% higher impacts. Modeling the KJST/KPIT meteorological data set, the ADJ\_U\* non-default

beta option results in up to 40% higher impacts. A chart showing the Homer City EGU one-hour SO<sub>2</sub> impacts is included in Attachment 6.

Attachment 6 shows that the modeled impacts from the Homer City EGU range from about 870 to 1485 µg/m<sup>3</sup>, depending on the meteorological data set and non-default beta option used. This wide range of modeled impacts is likely to complicate compliance verification modeling analyses.

## 7. Summary

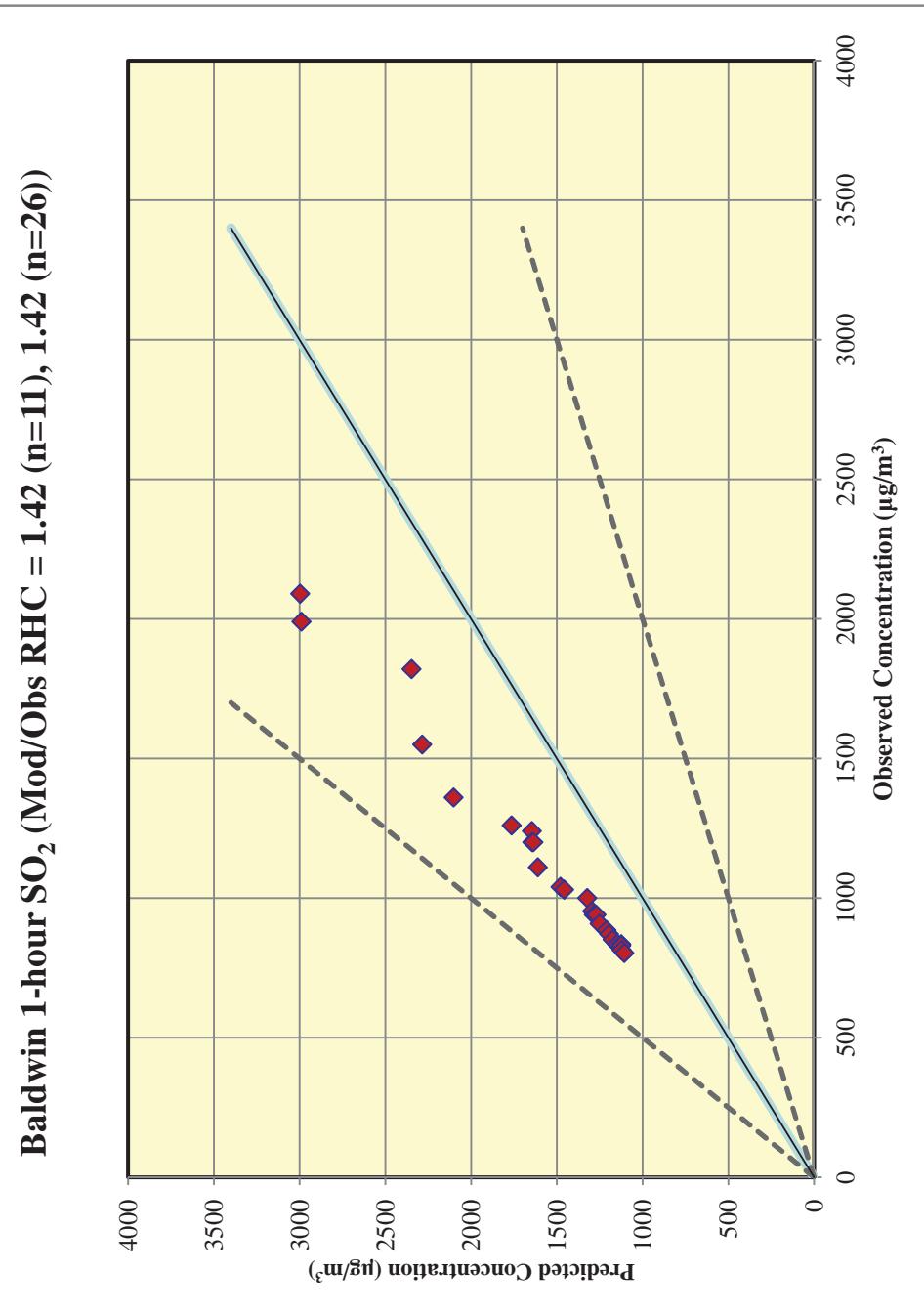
Using AERMOD/AERMET v. 12345, I modeled five field study evaluations and SO<sub>2</sub> emissions from the Homer City EGU. Based on these modeling analyses, I offer the following conclusions and recommendations:

- For the four AERMOD EGU evaluation studies analyzed here, v. 12345 beta options decrease model performance and increase variability of impacts.
- For the non-buoyant low-level Prairie Grass tracer release, the v. 12345 beta options also decrease model performance and increase variability of impacts.
- The beta options introduce new performance problems.
- Efforts will be better spent collecting multi-level site-specific met data (with turbulence parameters).
- Site-specific met and AQ data are always useful, but rarely exist for major SO<sub>2</sub> sources (pre-construction monitoring requirements often waived).
- Major emission sources should routinely collect post-construction ambient AQ data, to augment modeled impacts and to ensure compliance
- AERMOD has been rigorously evaluated: the revised model formulations are not necessary and are a step backwards for EGUs.
- The Prairie Grass field study evaluation shows that v. 12345 beta options do not improve model performance for low-level releases.

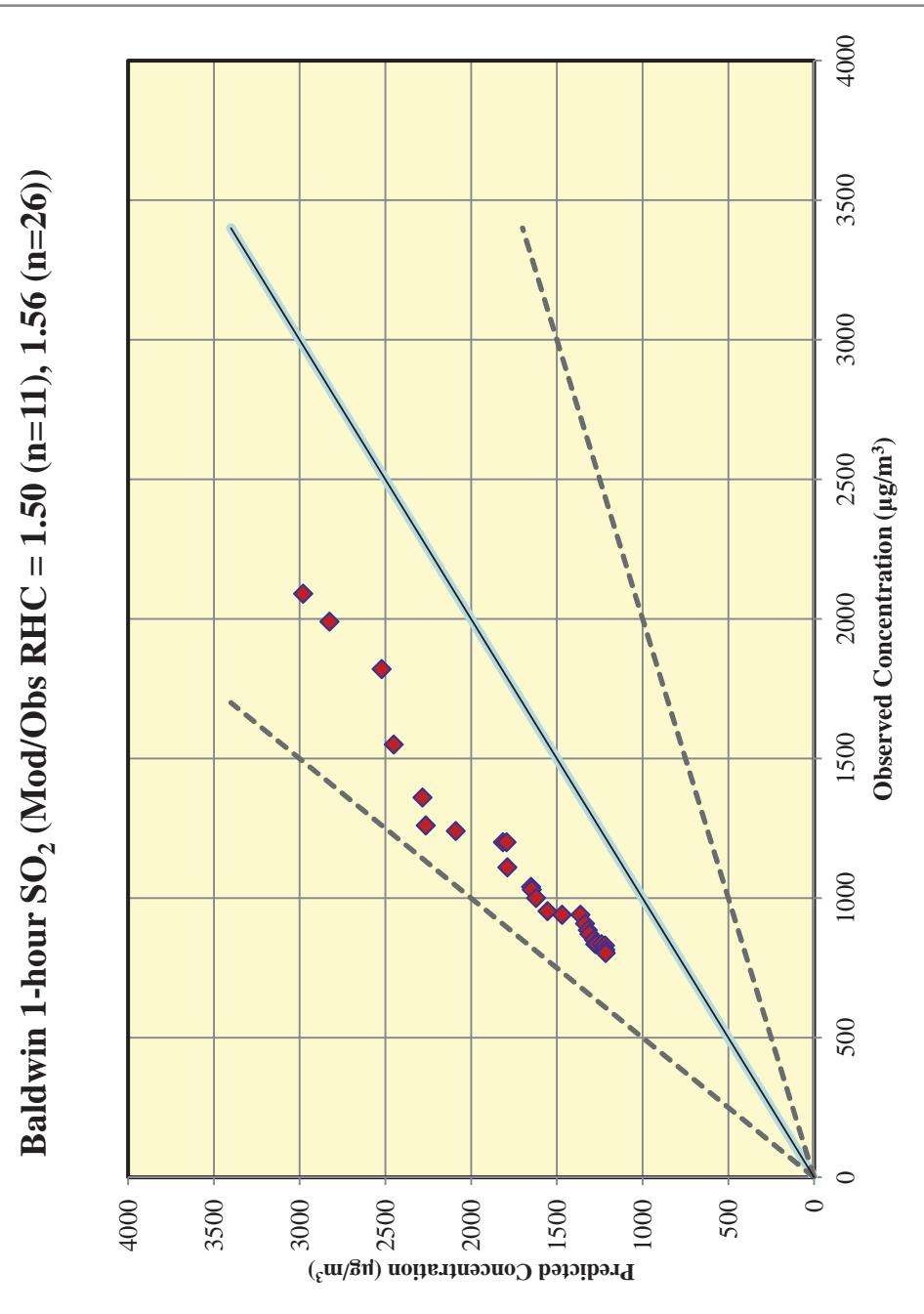
Attachment 1:

Quantile-Quantile Plots for Baldwin EGU Evaluation

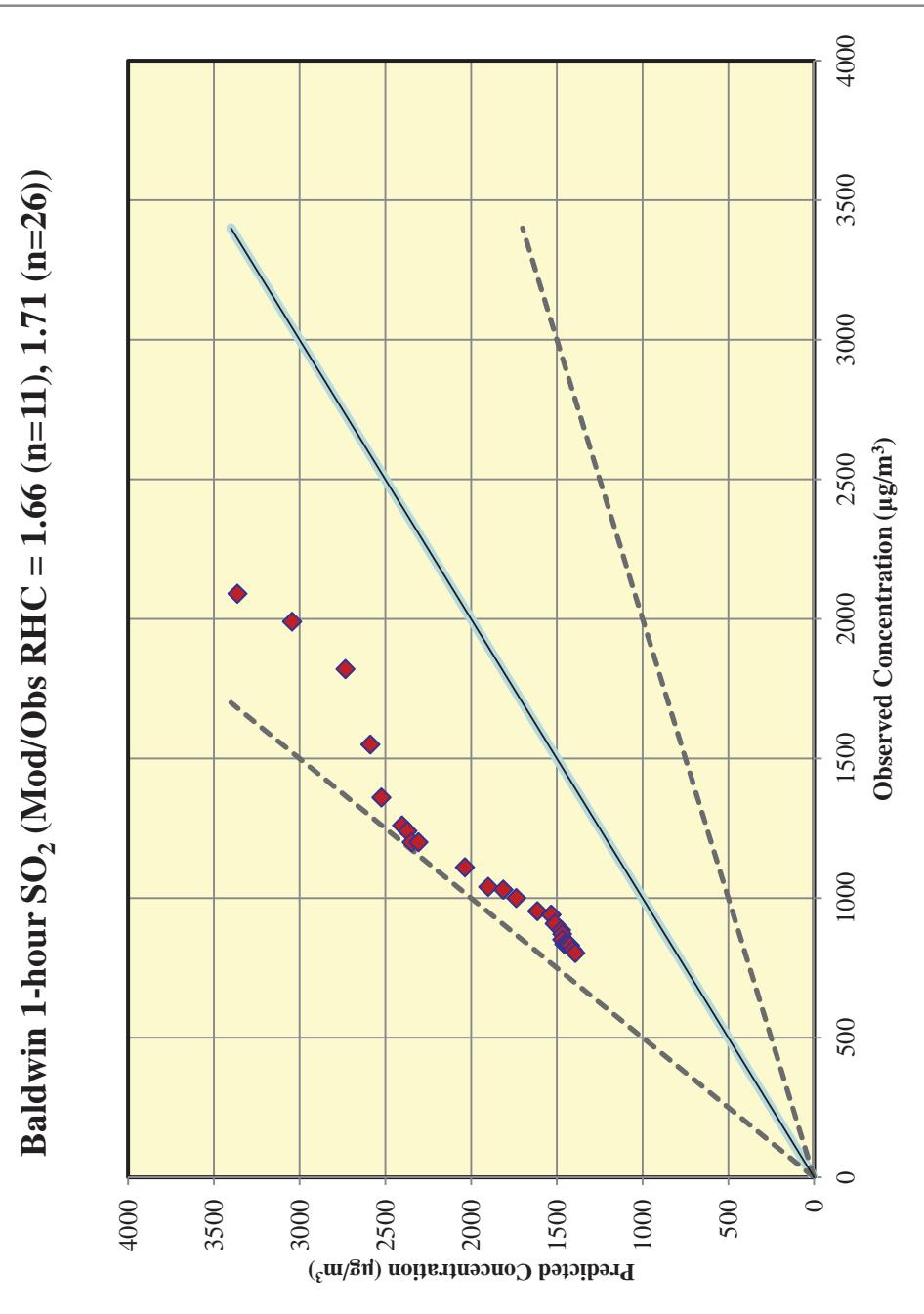
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 02222**



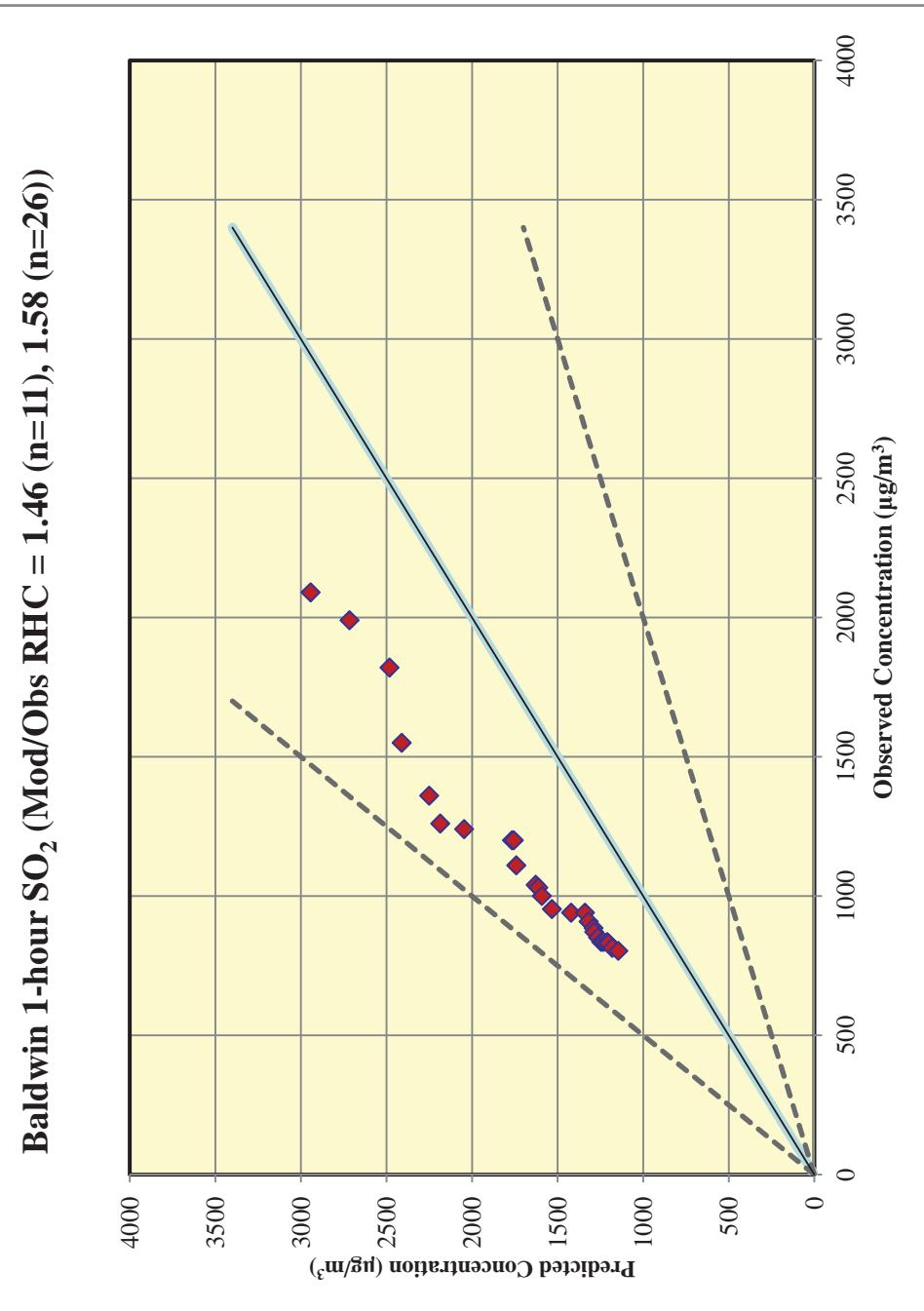
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345**



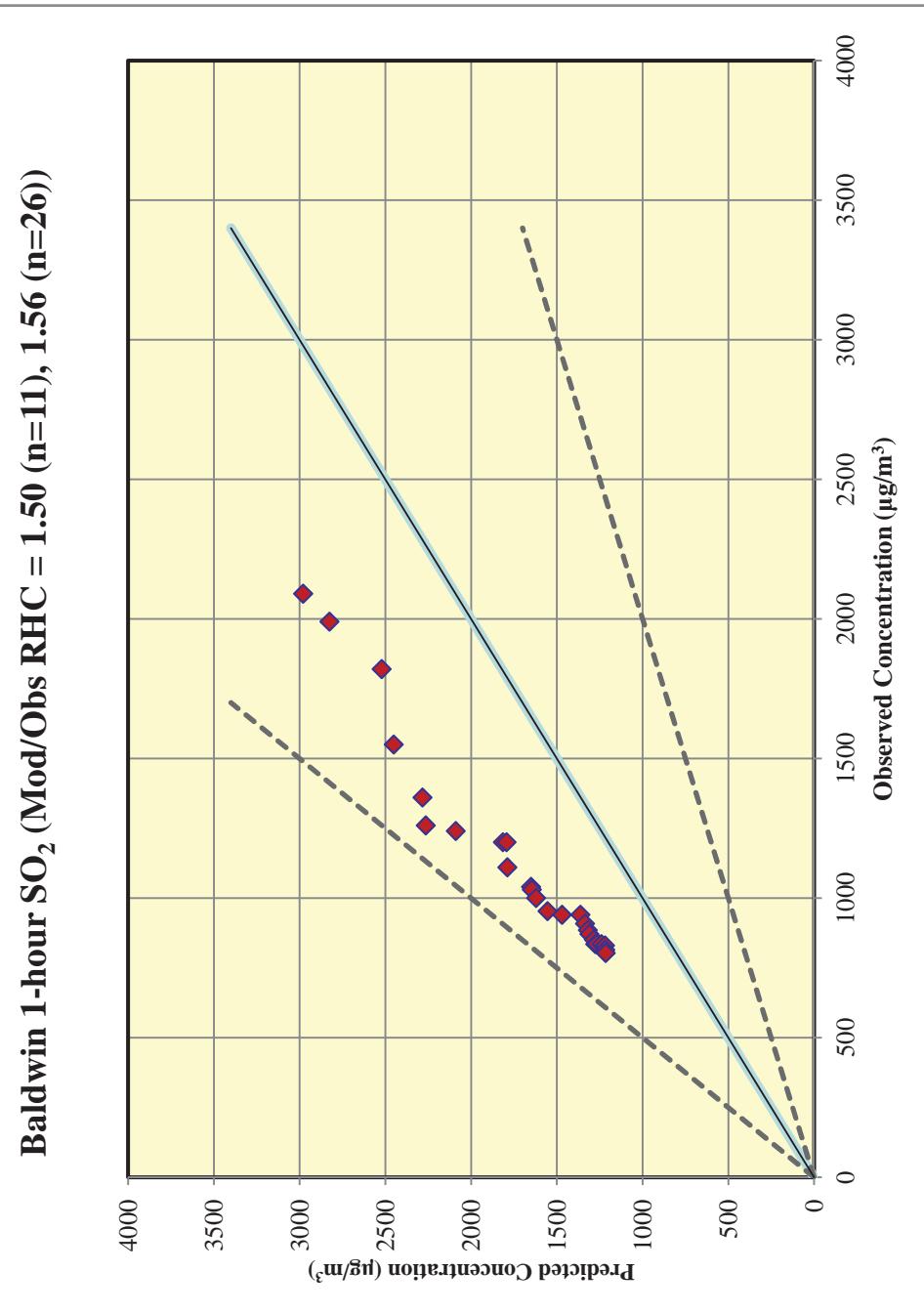
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND1 (0.5 0.5)**



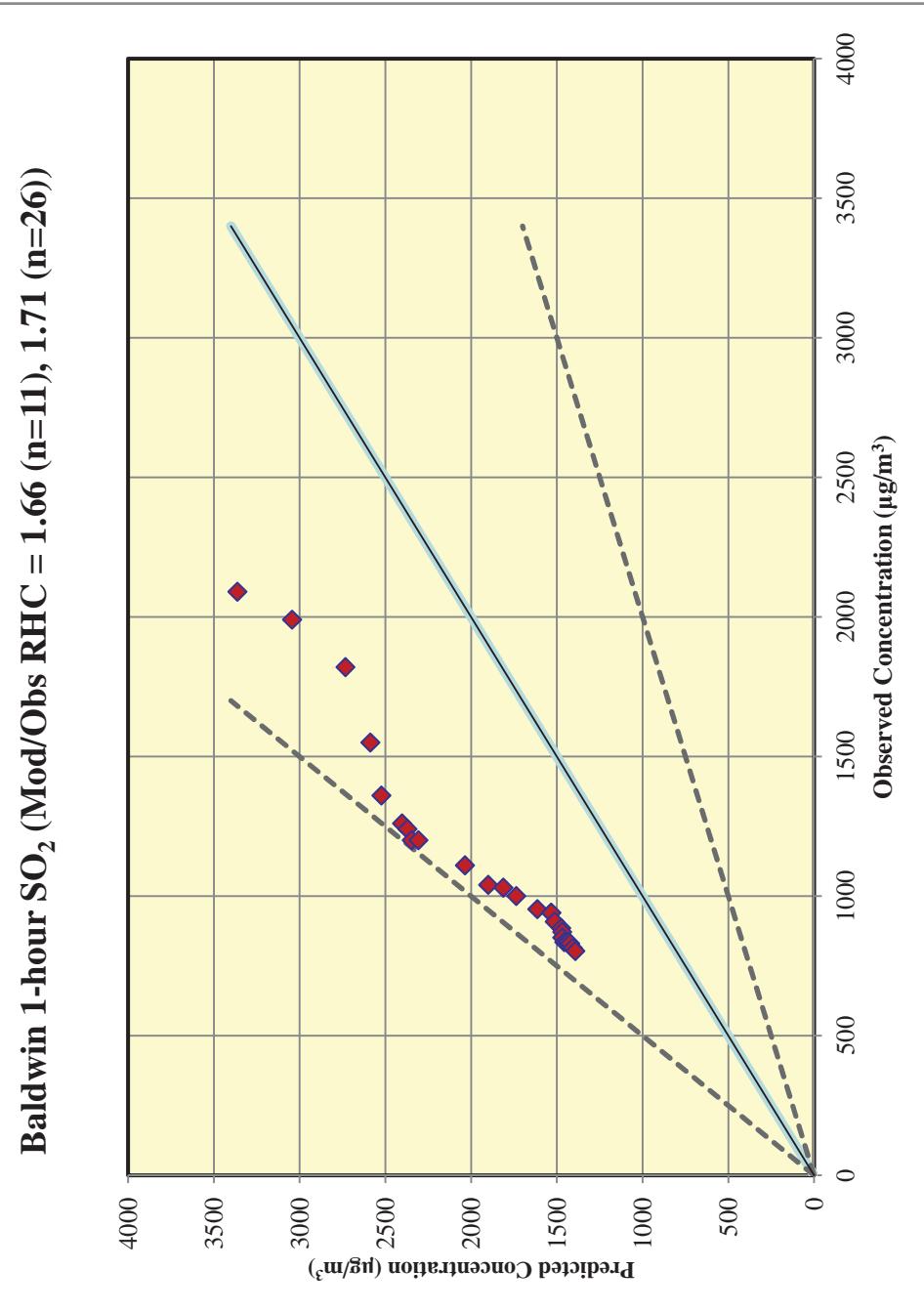
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND2 (0.3 0.5 0.95)**



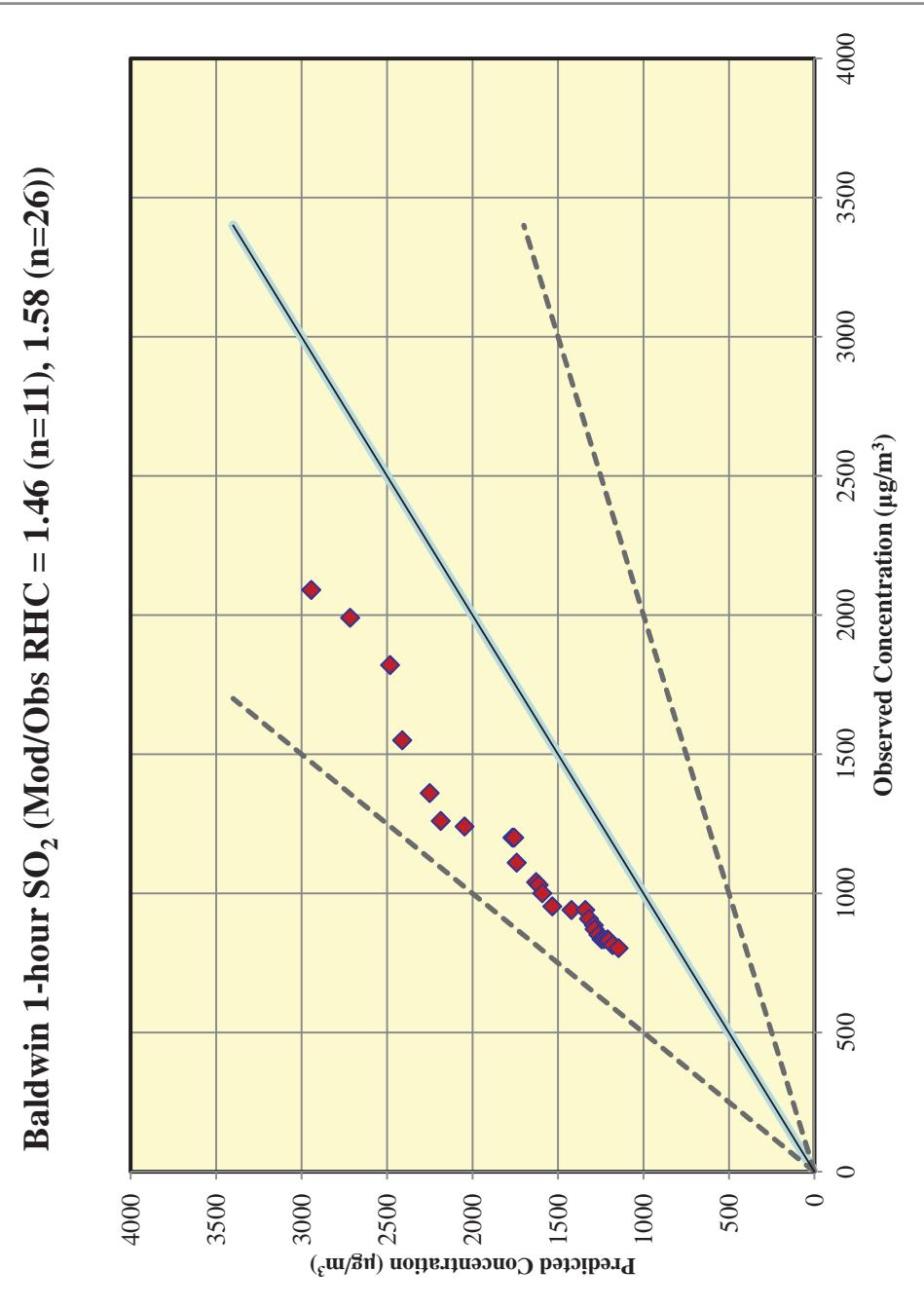
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\***



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND1 (0.5 0.5)**



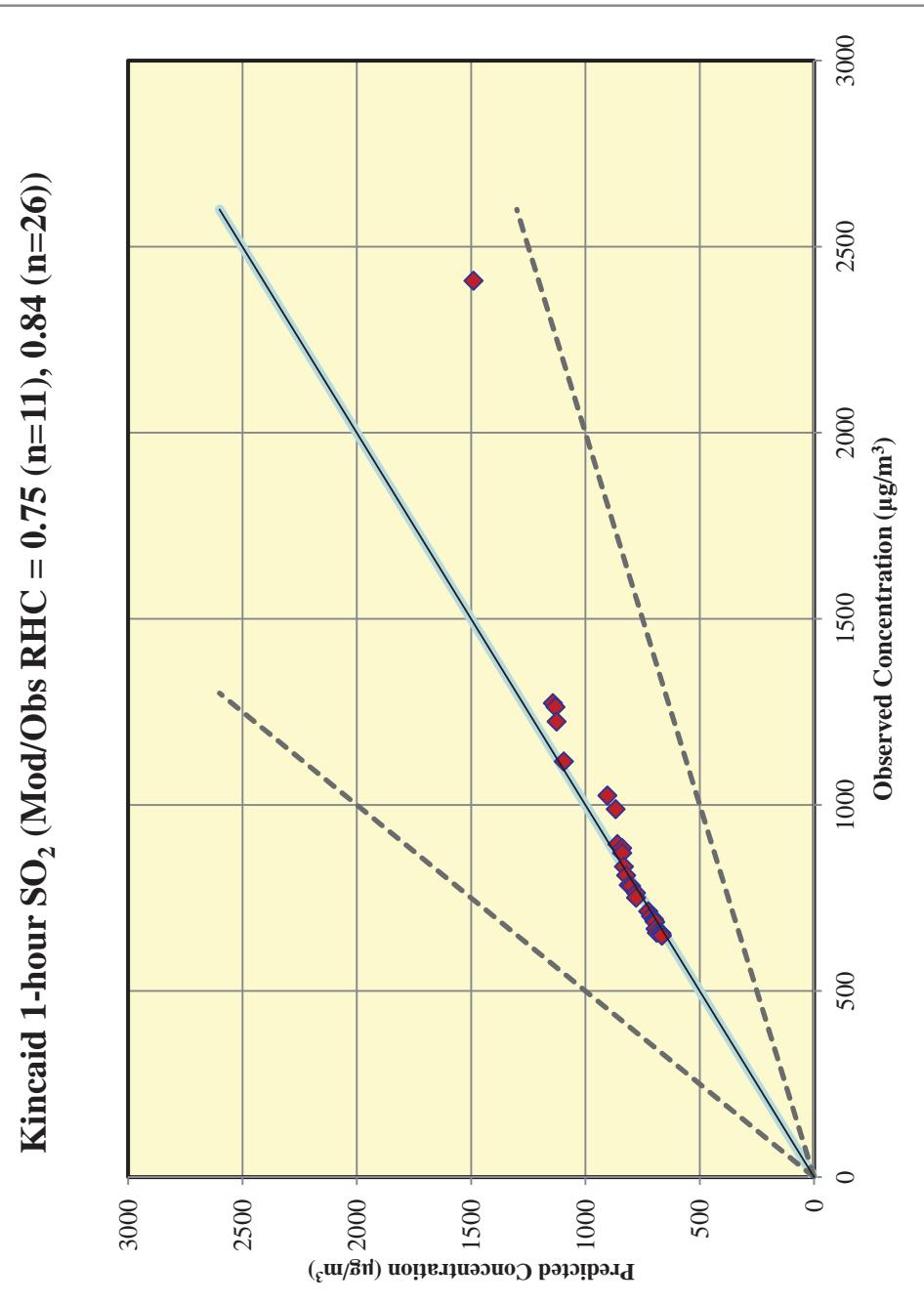
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND2 (0.3 0.5 0.95)**



Attachment 2:

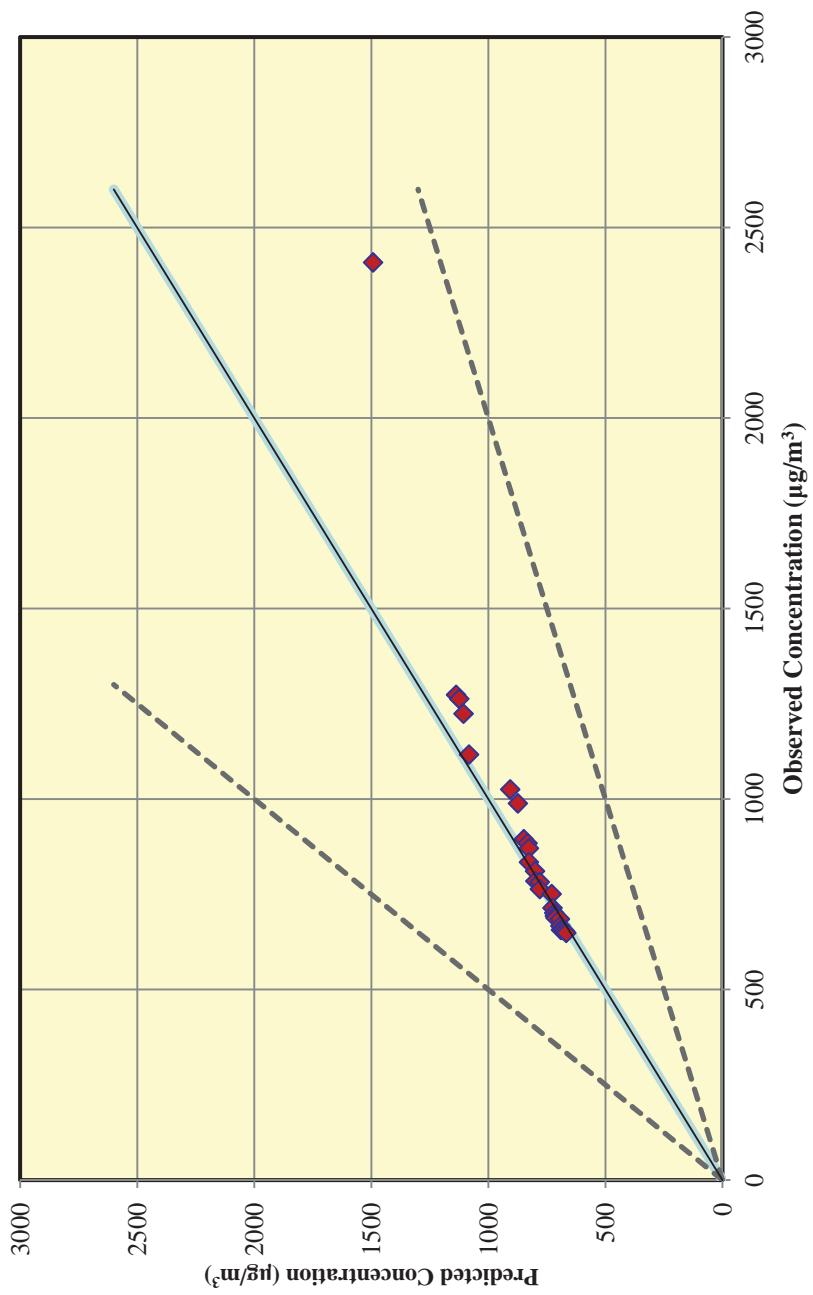
Quantile-Quantile Plots for Kincaid EGU Evaluation

**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 02222**

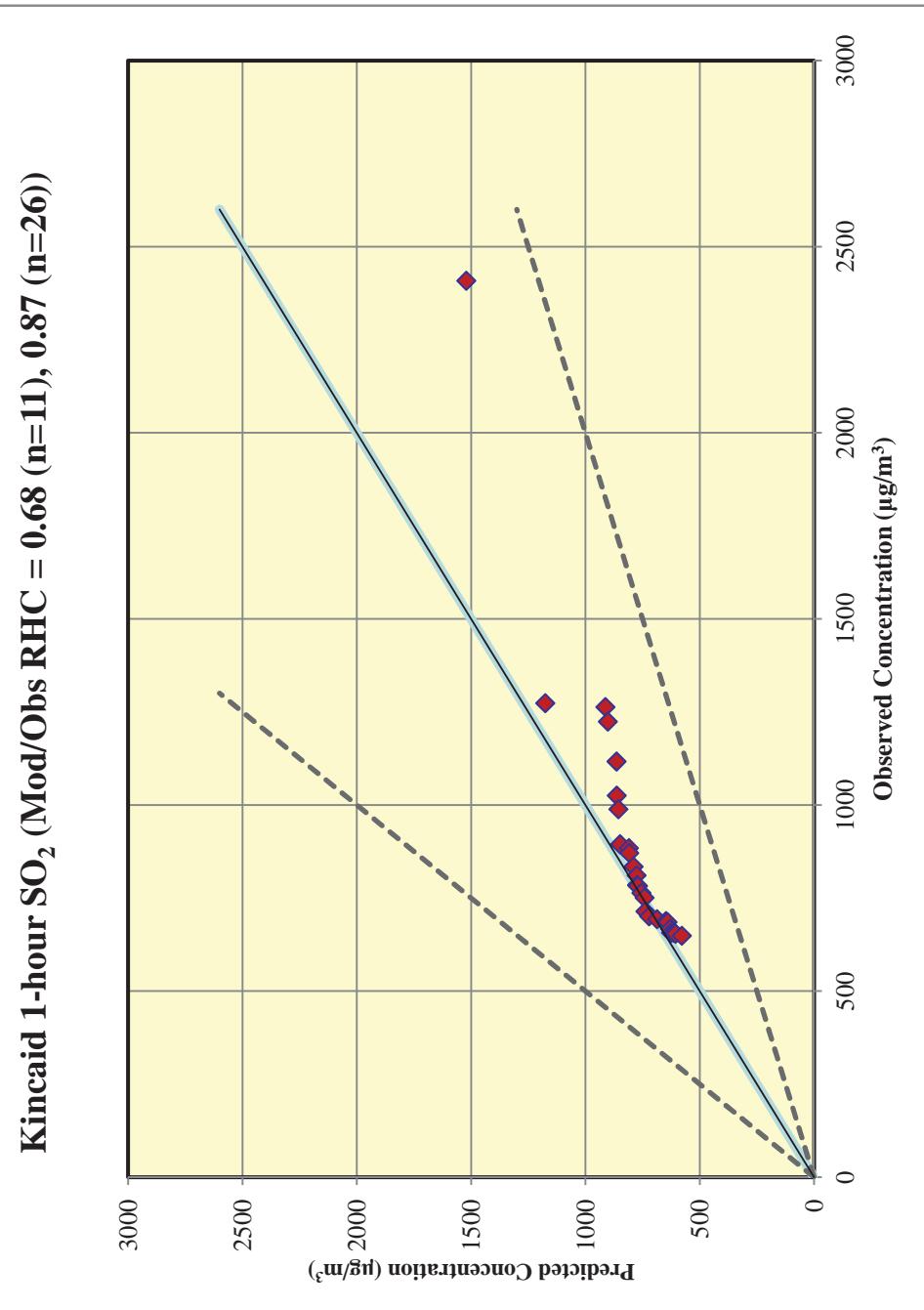


**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345**

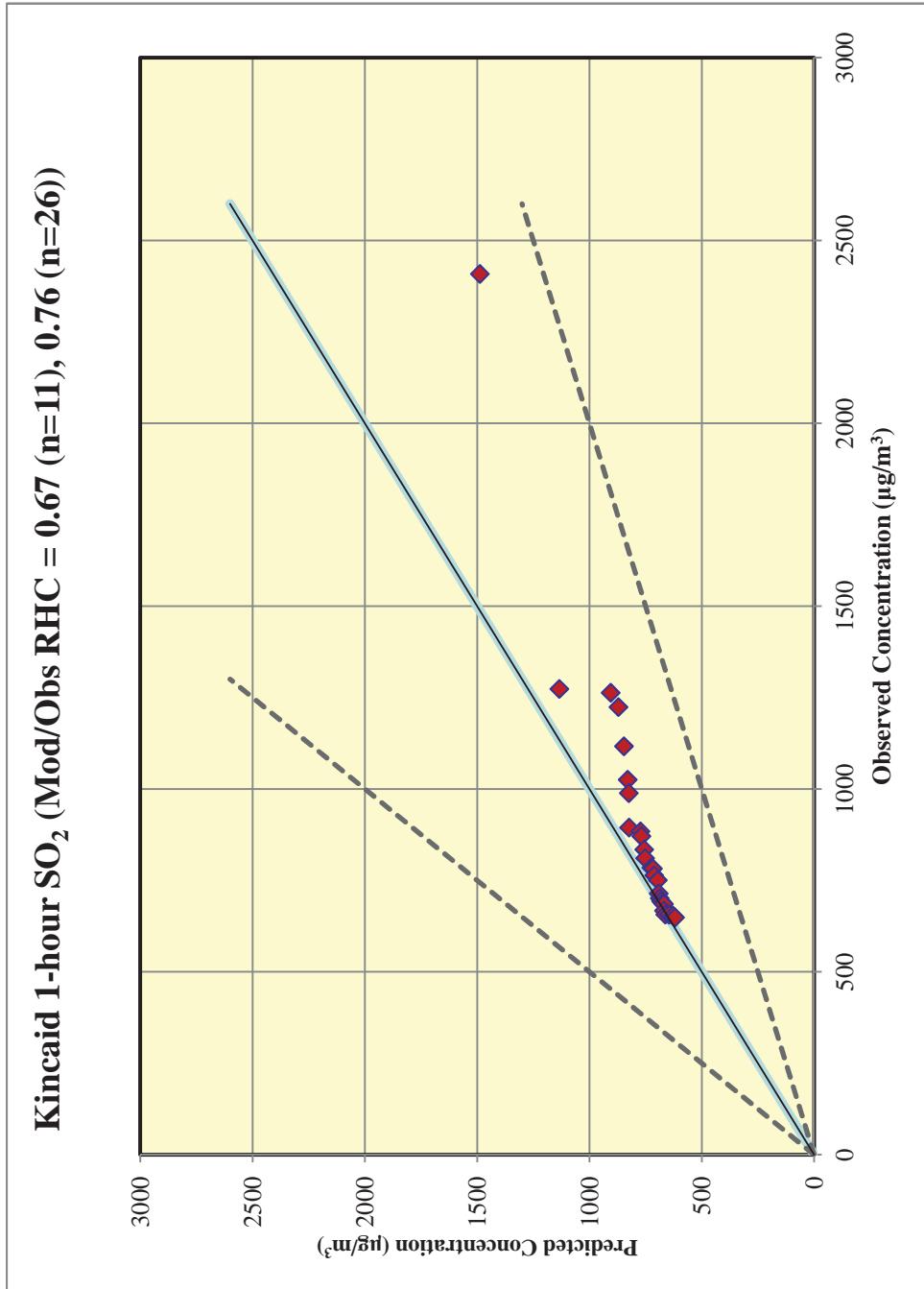
Kincaid 1-hour SO<sub>2</sub> (Mod/Obs RHC = 0.75 (n=11), 0.83 (n=26))



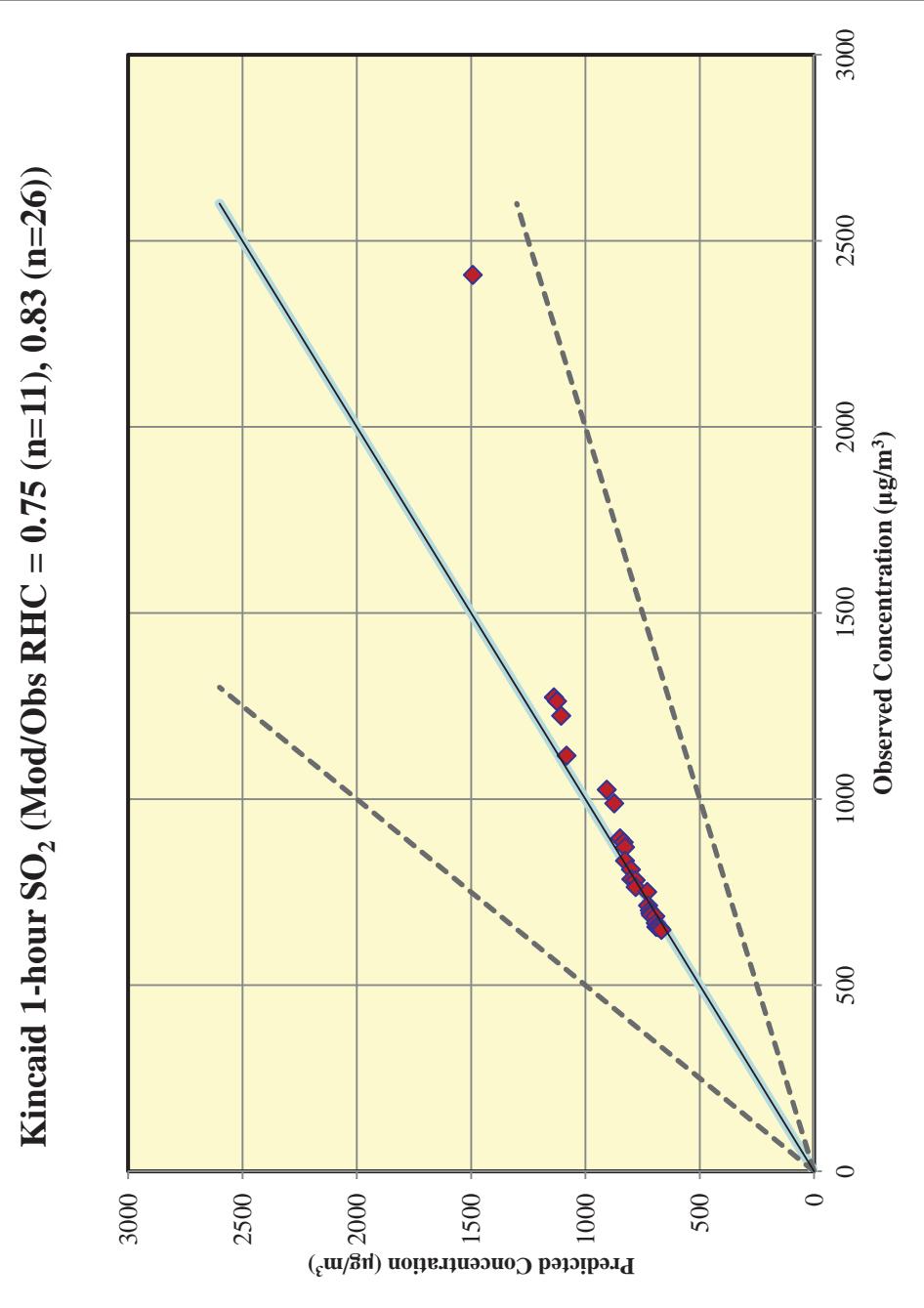
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND1 (0.5 0.5)**



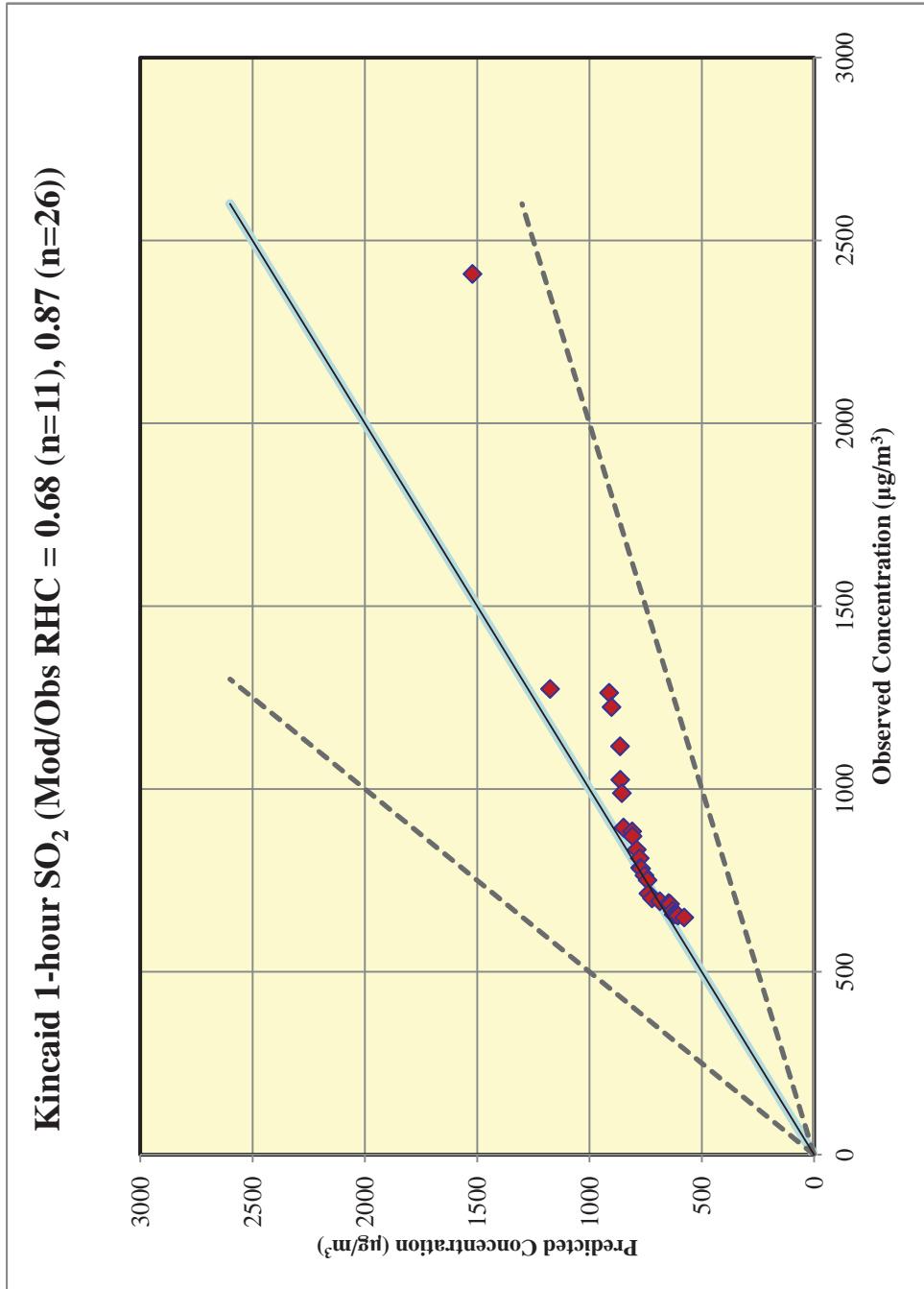
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND2 (0.3 0.5 0.95)**



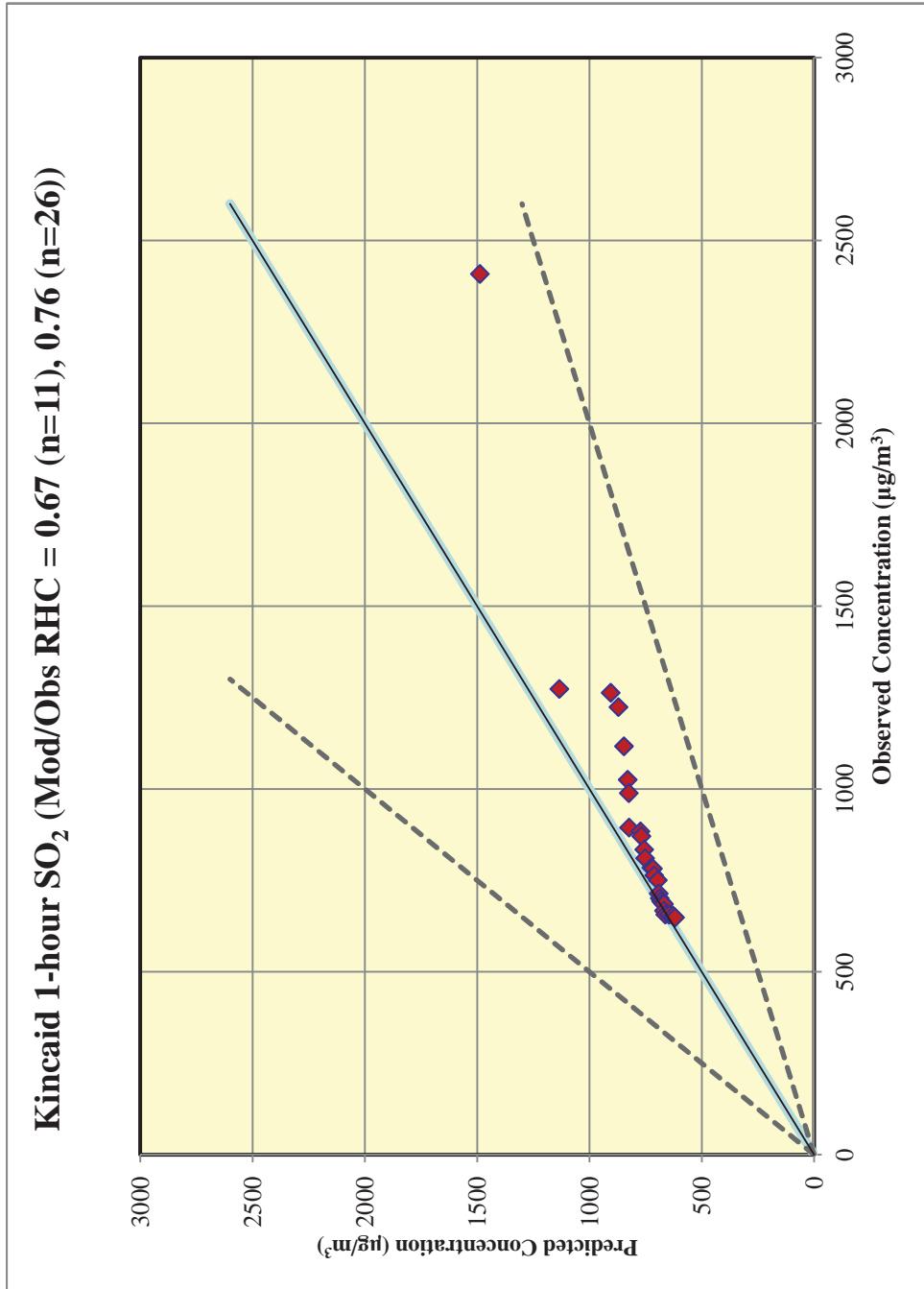
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\***



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND1 (0.5 0.5)**



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND2 (0.3 0.5 0.95)**

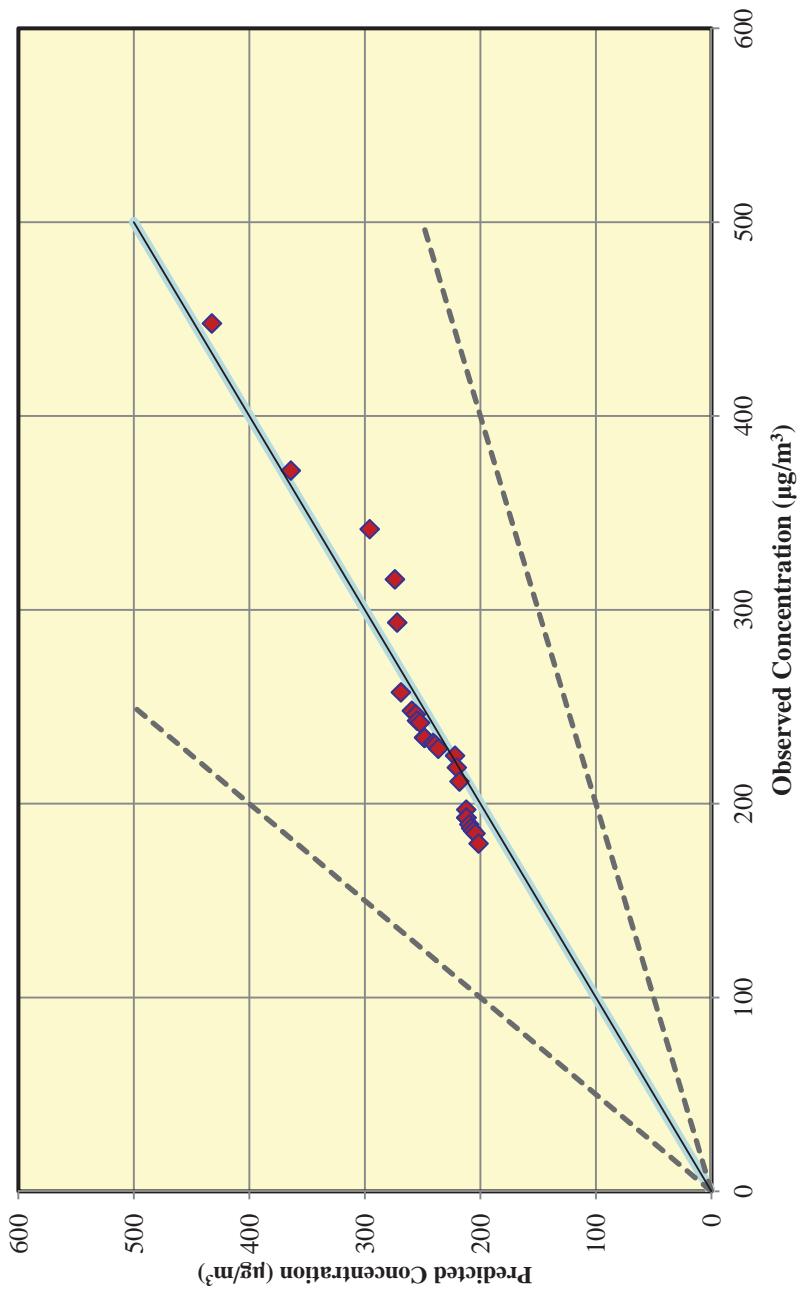


Attachment 3:

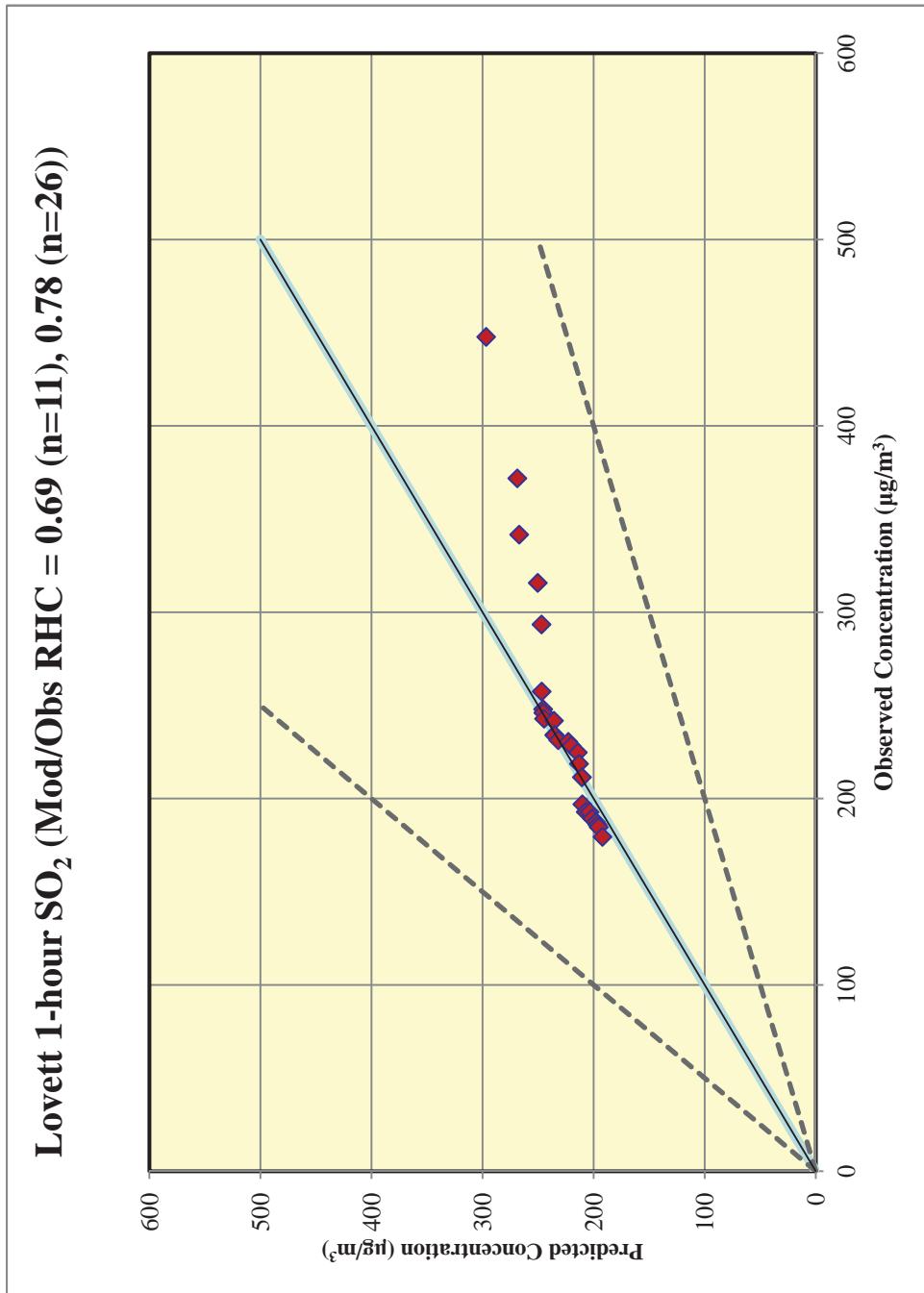
Quantile-Quantile Plots for Lovett EGU Evaluation

**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 02222**

**Lovett 1-hour SO<sub>2</sub> (Mod/Obs RHC = 0.89 (n=11), 0.90 (n=26))**

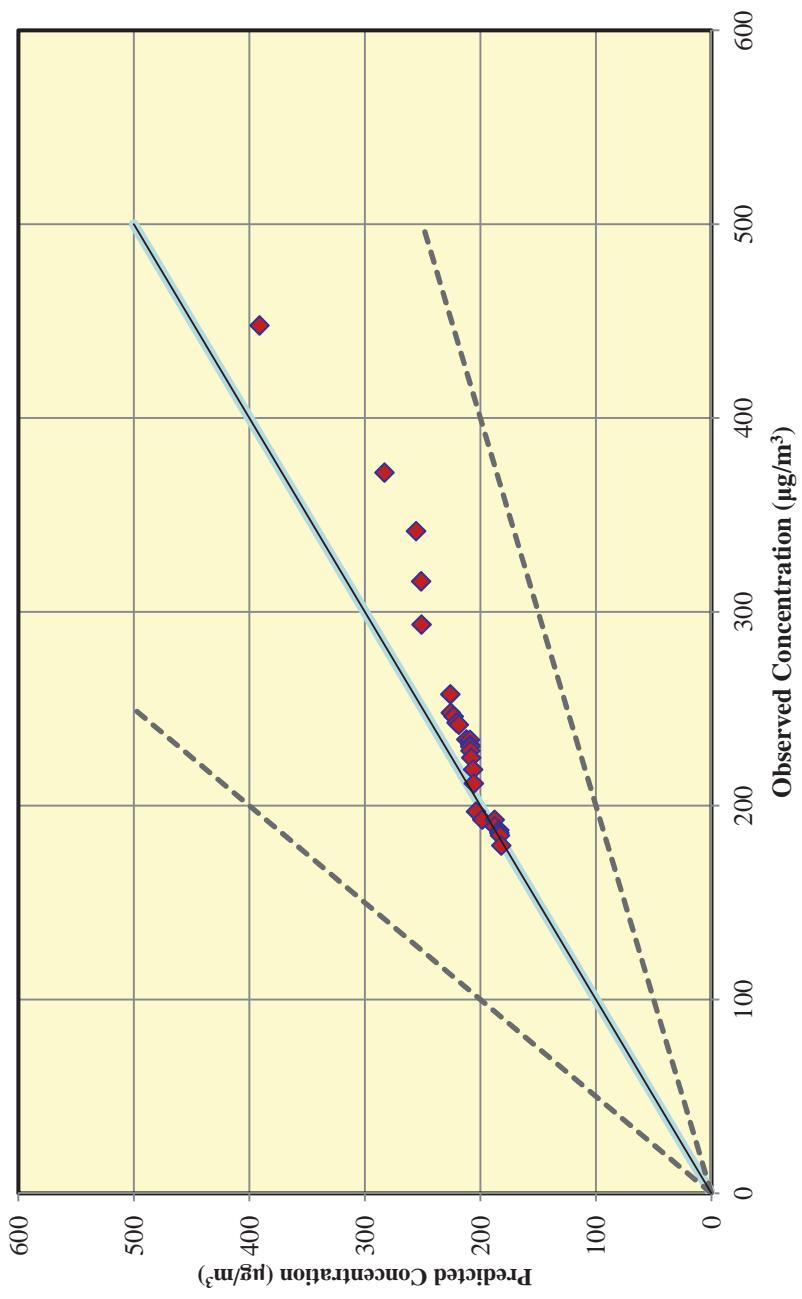


# Evaluation of 26 highest Modeled and Monitored Concentrations: AERMOD v. 12345

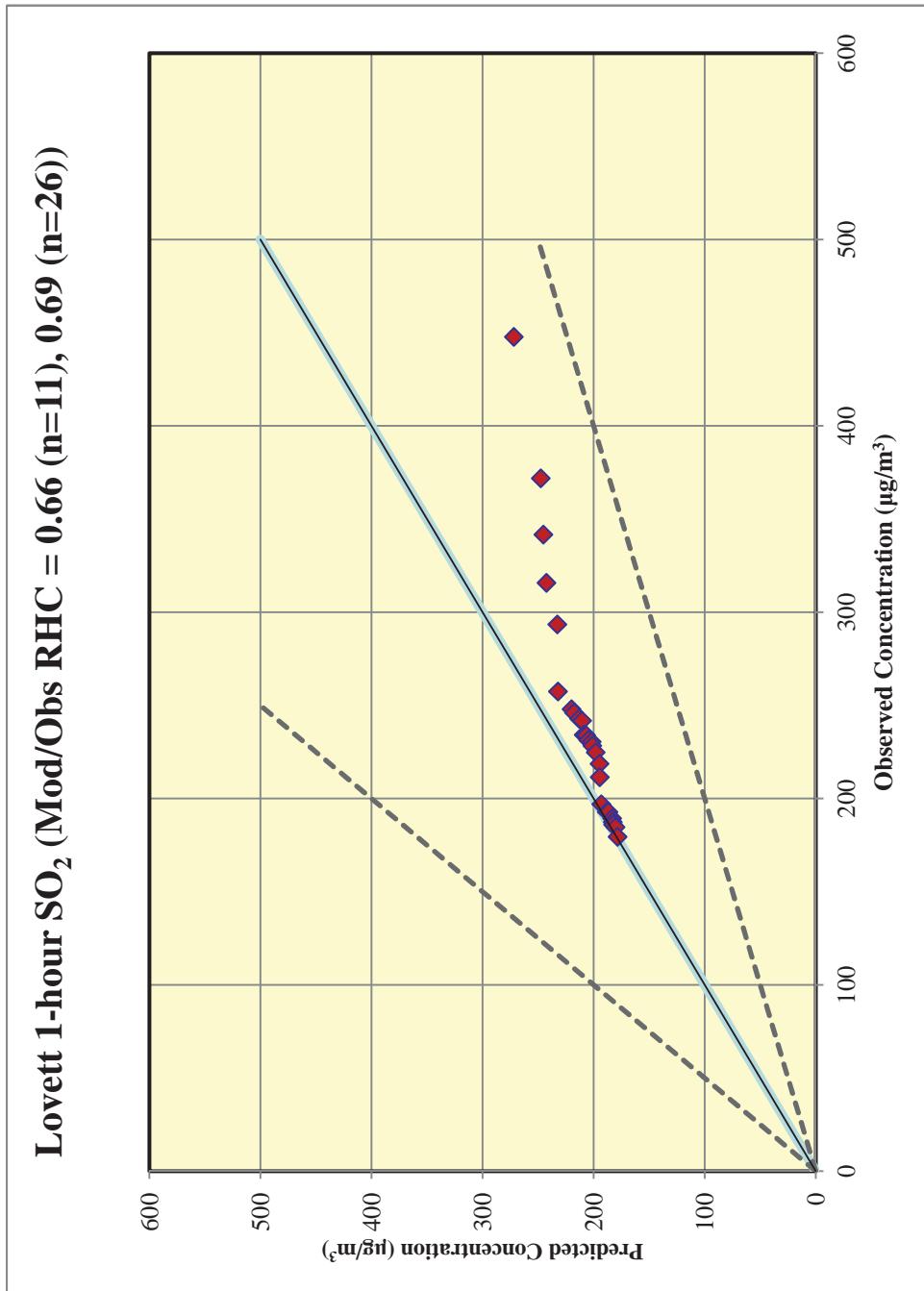


**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND1 (0.5 0.5)**

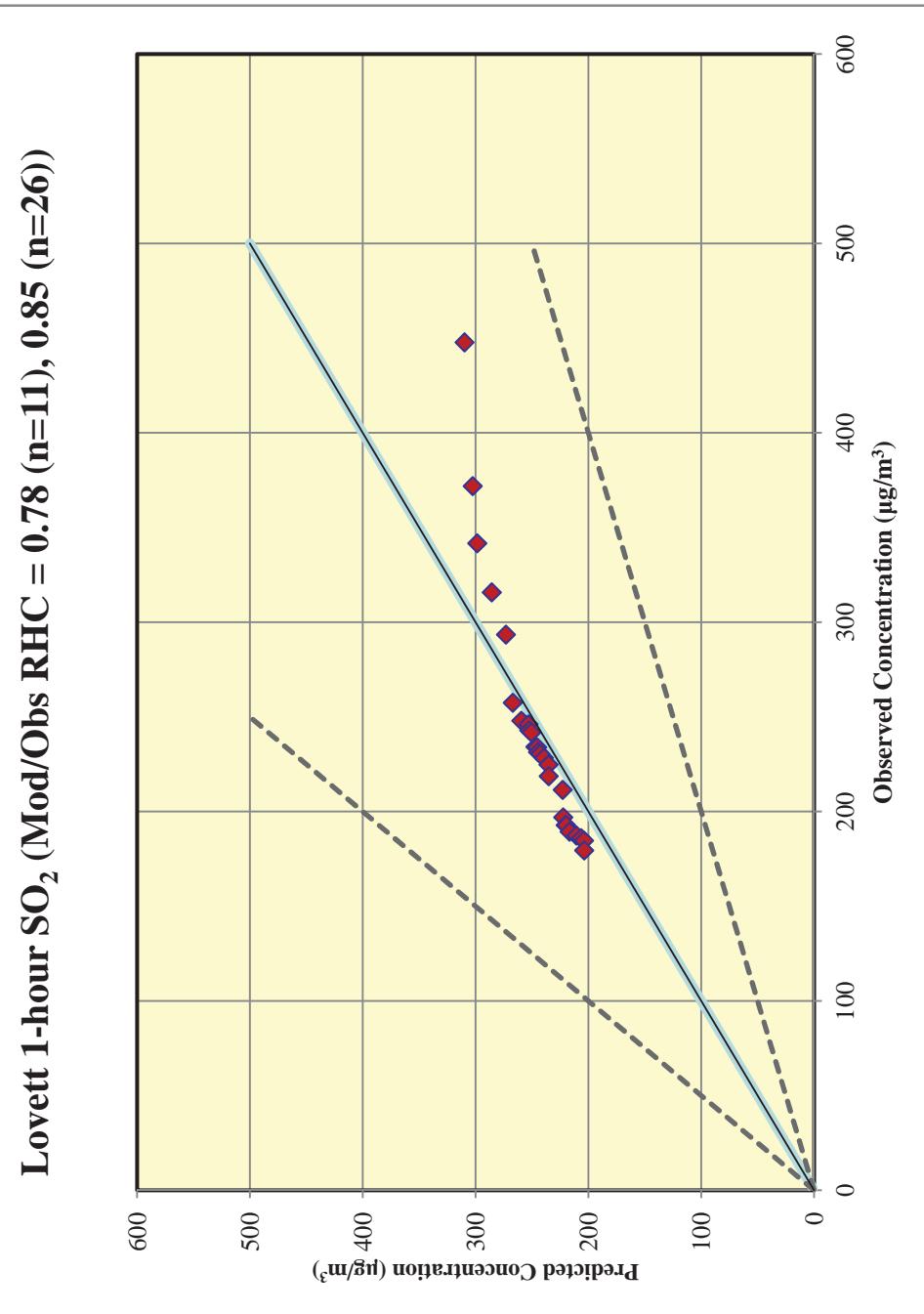
**Lovett 1-hour SO<sub>2</sub> (Mod/Obs RHC = 0.79 (n=11), 0.77 (n=26))**



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND2 (0.3 0.5 0.95)**

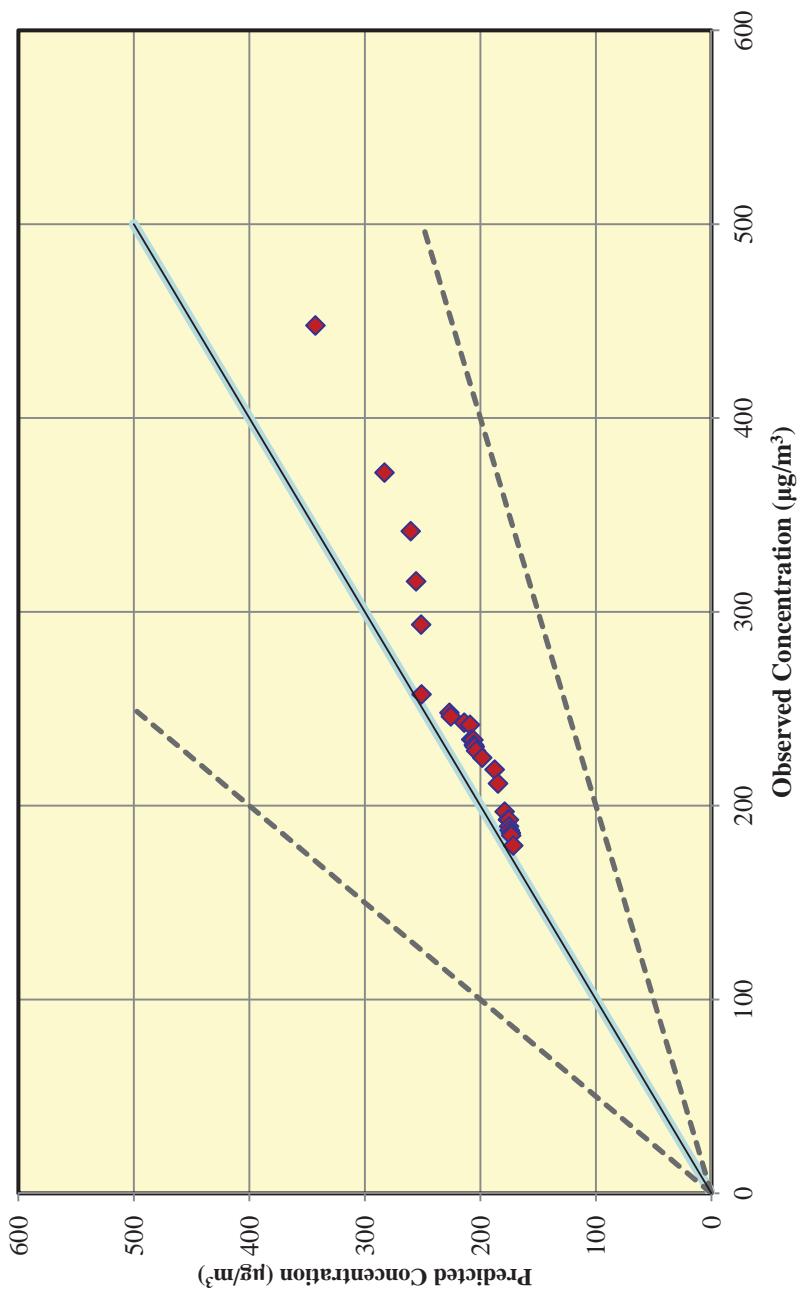


## Evaluation of 26 highest Modeled and Monitored Concentrations: AERMOD v. 12345, Beta ADJ\_U\*



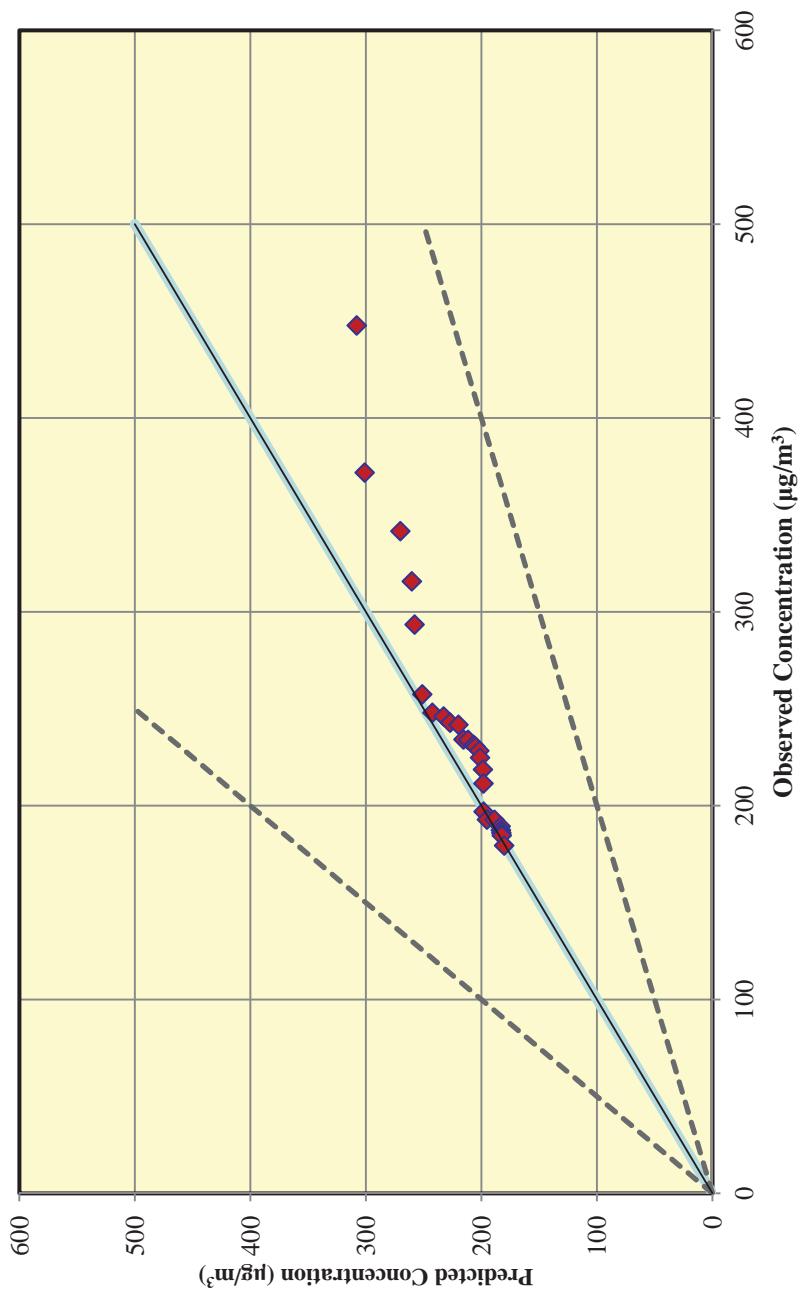
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND1 (0.5 0.5)**

**Lovett 1-hour SO<sub>2</sub> (Mod/Obs RHC = 0.79 (n=11), 0.77 (n=26))**



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND2 (0.3 0.5 0.95)**

**Lovett 1-hour SO<sub>2</sub> (Mod/Obs RHC = 0.79 (n=11), 0.78 (n=26))**

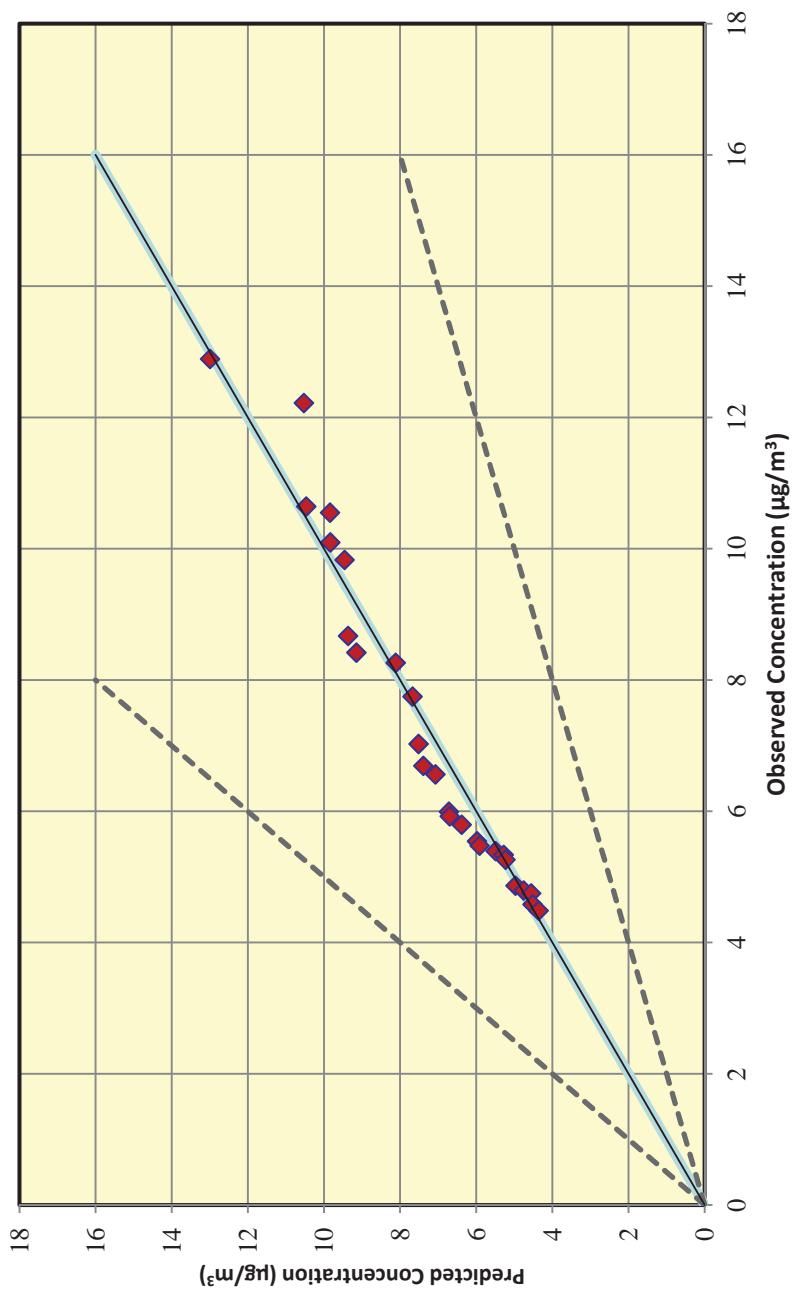


Attachment 4:

Quantile-Quantile Plots for Tracy EGU Evaluation

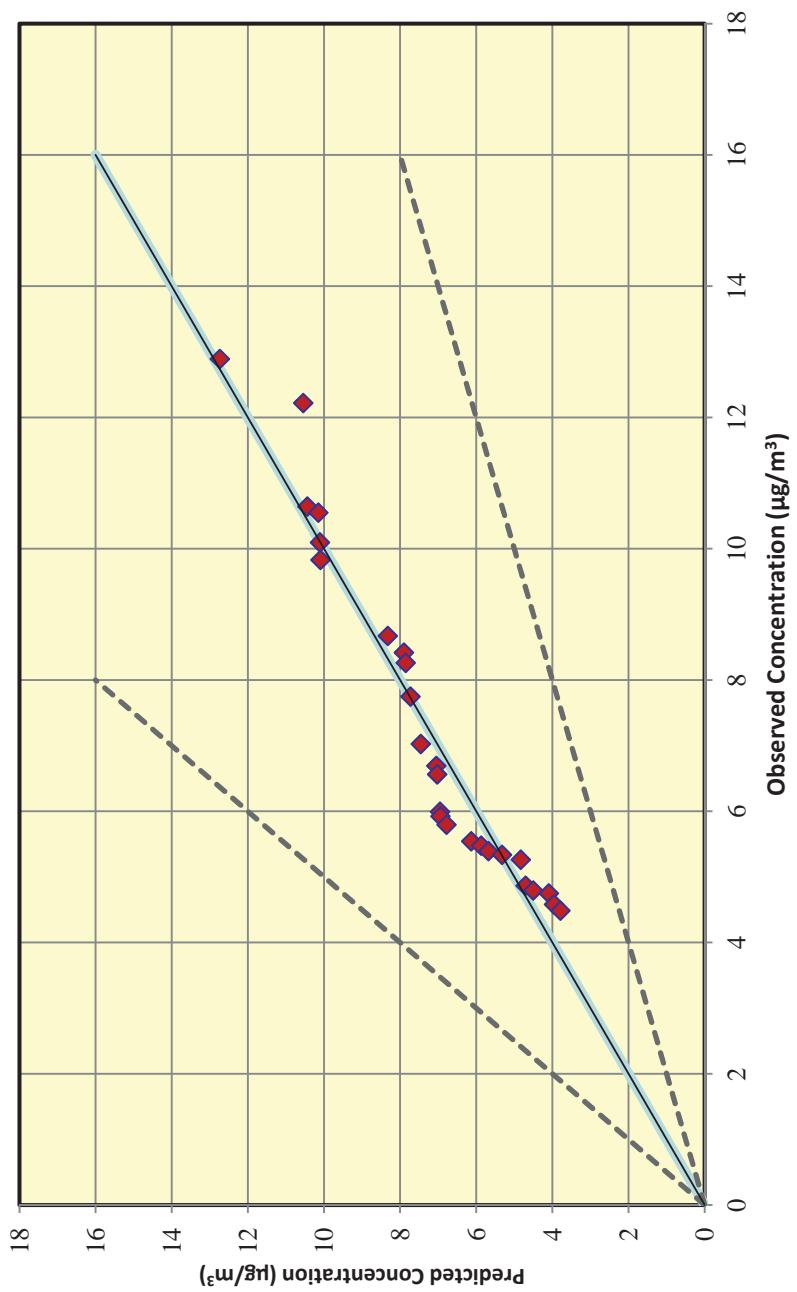
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 02222**

**Tracy 1-Hour SF<sub>6</sub> (Mod/Obs RHC = 0.91 (n=11), 1.05 (n=26))**



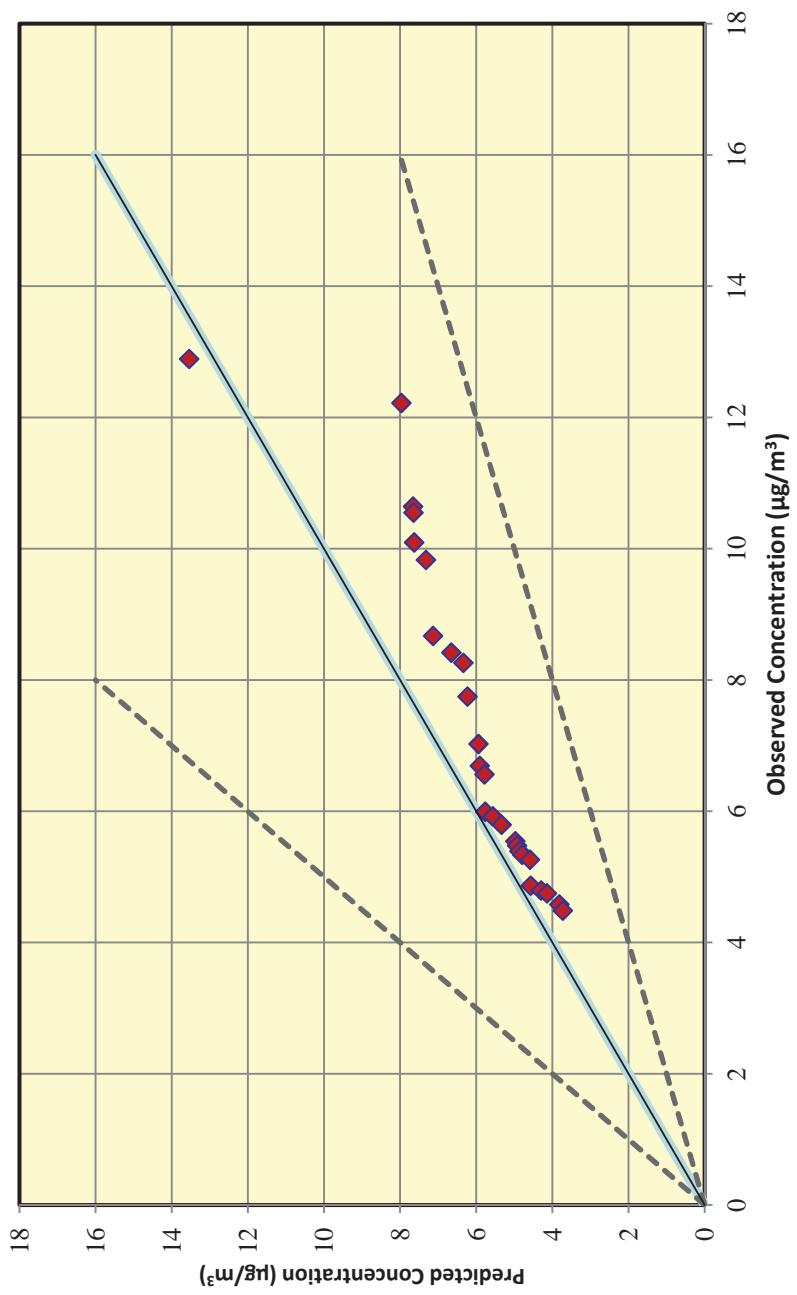
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345**

Tracy 1-Hour SF<sub>6</sub> (Mod/Obs RHC = 0.89 (n=11), 1.12 (n=26))



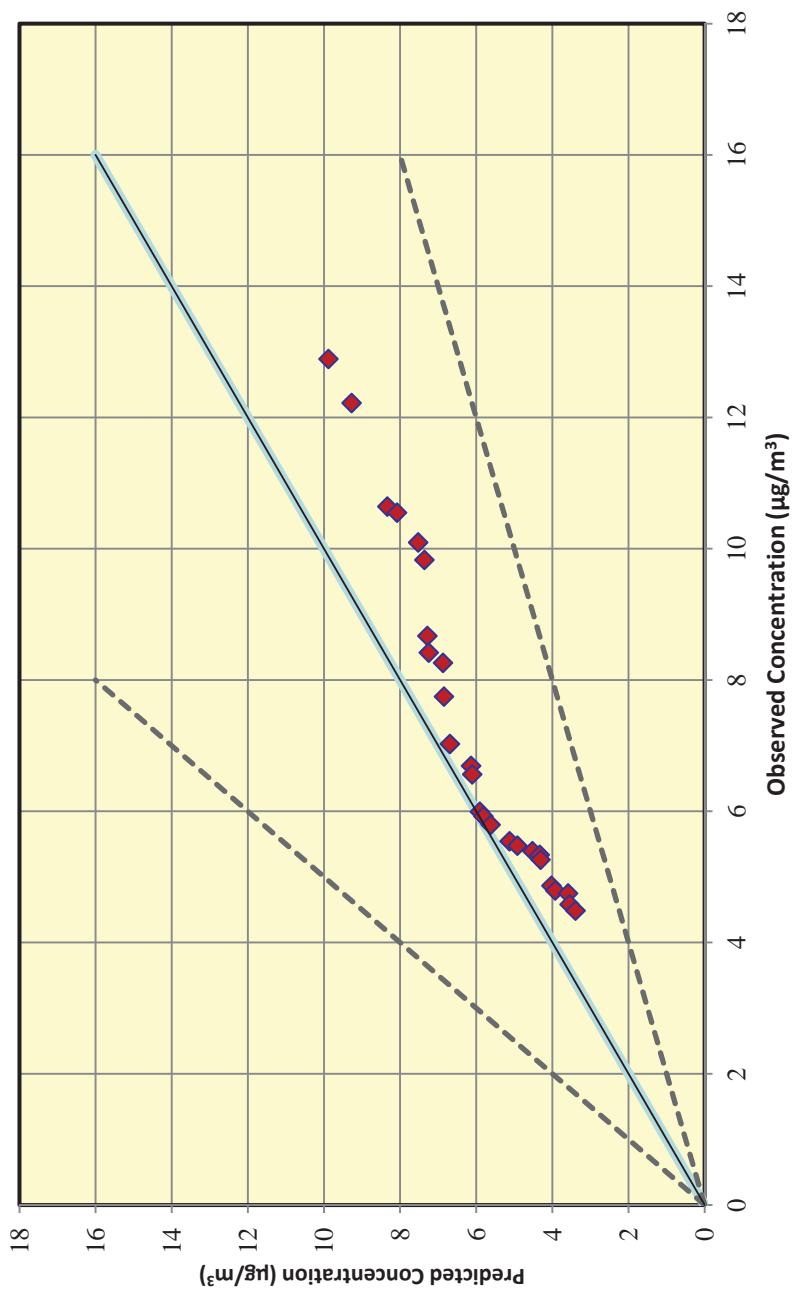
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND1 (0.5 0.5)**

Tracy 1-Hour SF<sub>6</sub> (Mod/Obs RHC = 0.74 (n=11), 0.84 (n=26))



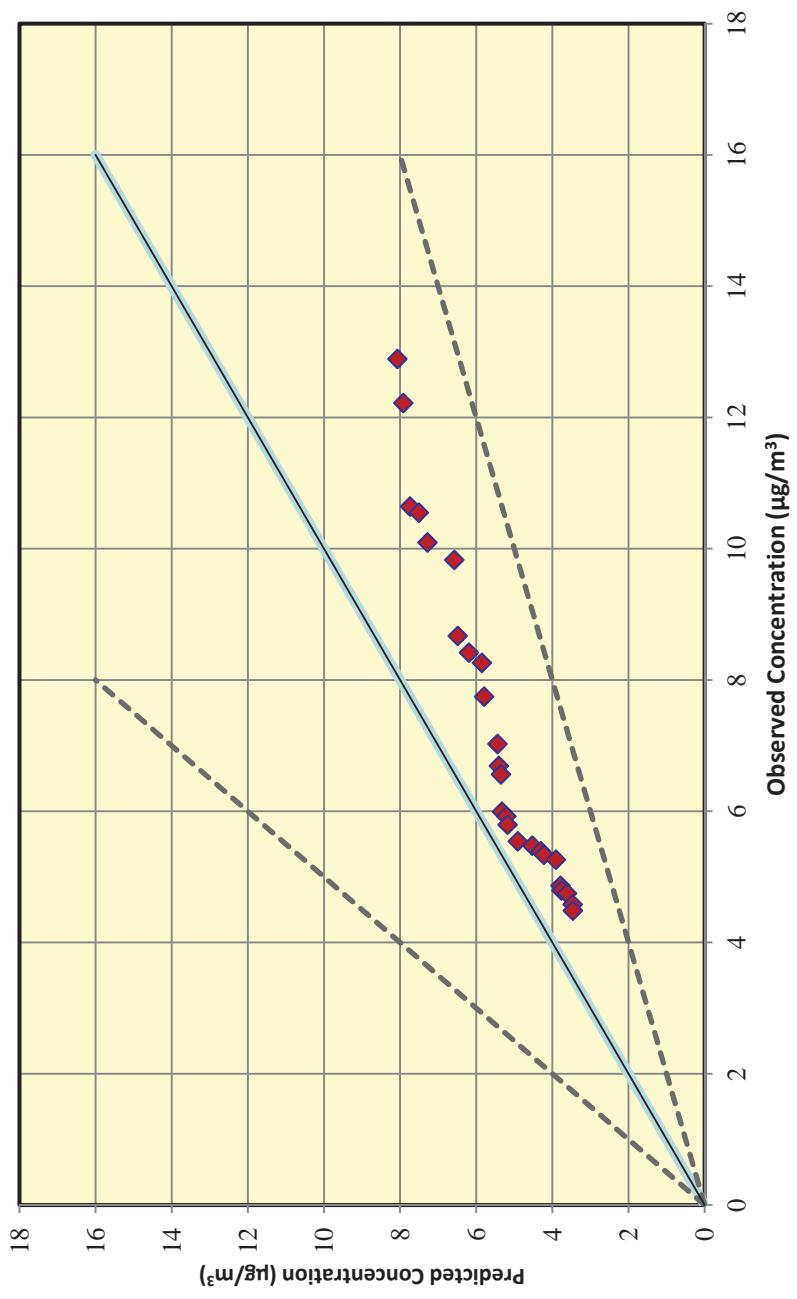
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND2 (0.3 0.5 0.95)**

Tracy 1-Hour SF<sub>6</sub> (Mod/Obs RHC = 0.66 (n=11), 0.90 (n=26))



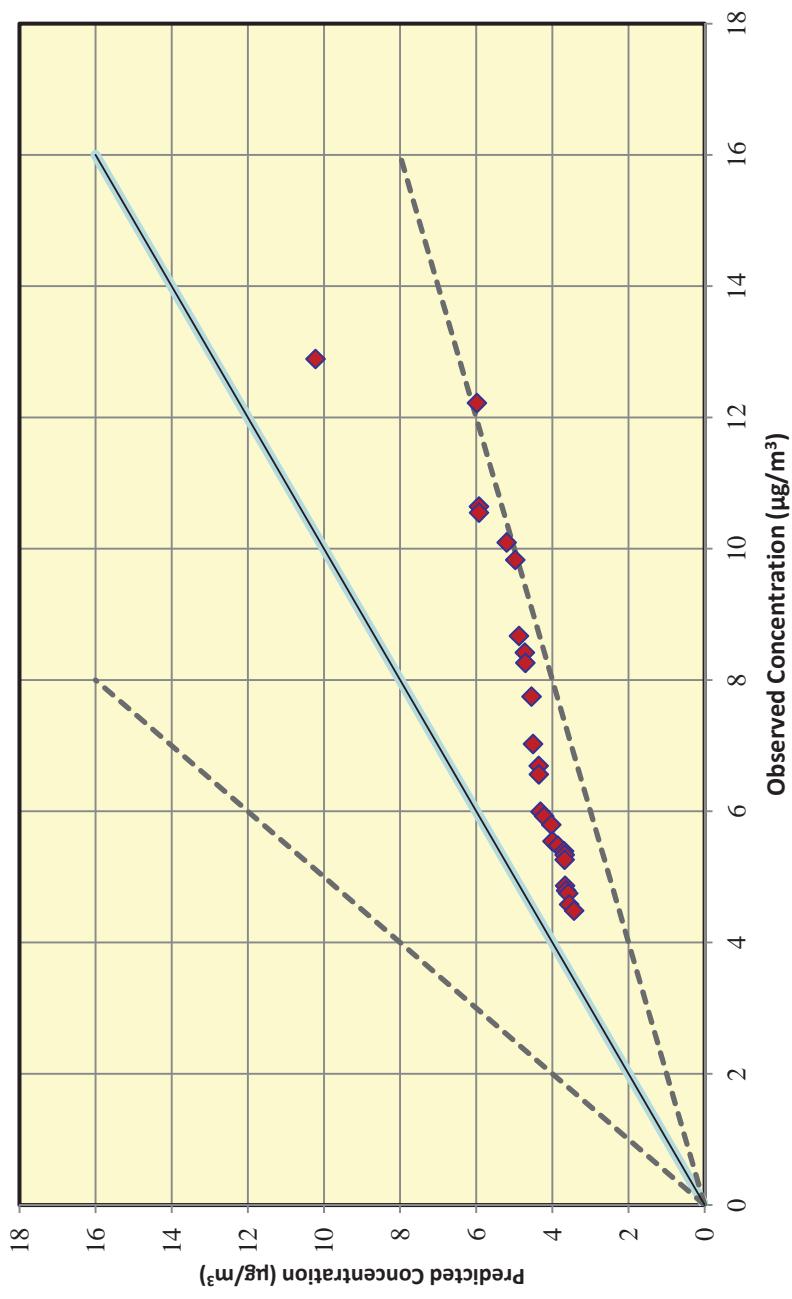
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\***

**Tracy 1-Hour SF<sub>6</sub> (Mod/Obs RHC = 0.64 (n=11), 0.74 (n=26))**



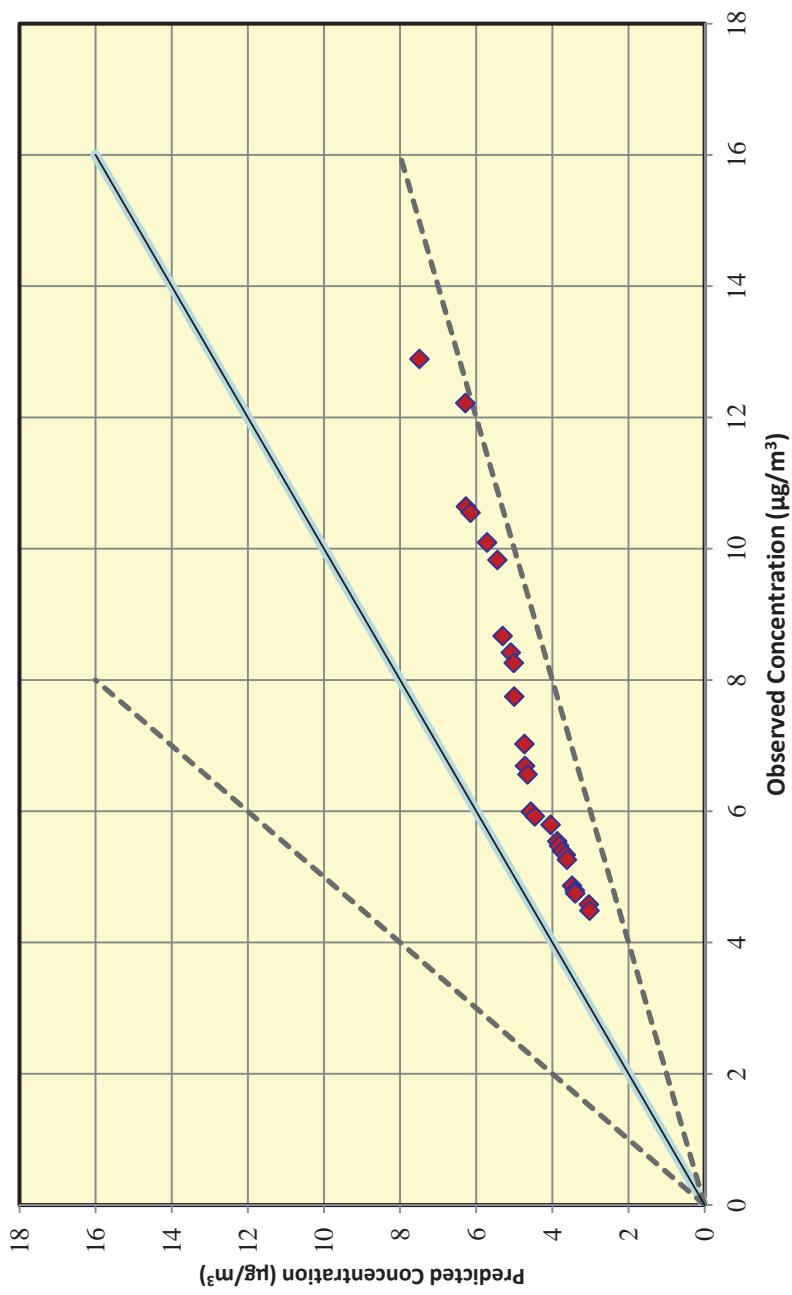
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND1 (0.5 0.5)**

Tracy 1-Hour SF<sub>6</sub> (Mod/Obs RHC = 0.52 (n=11), 0.53 (n=26))



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND2 (0.3 0.5 0.95)**

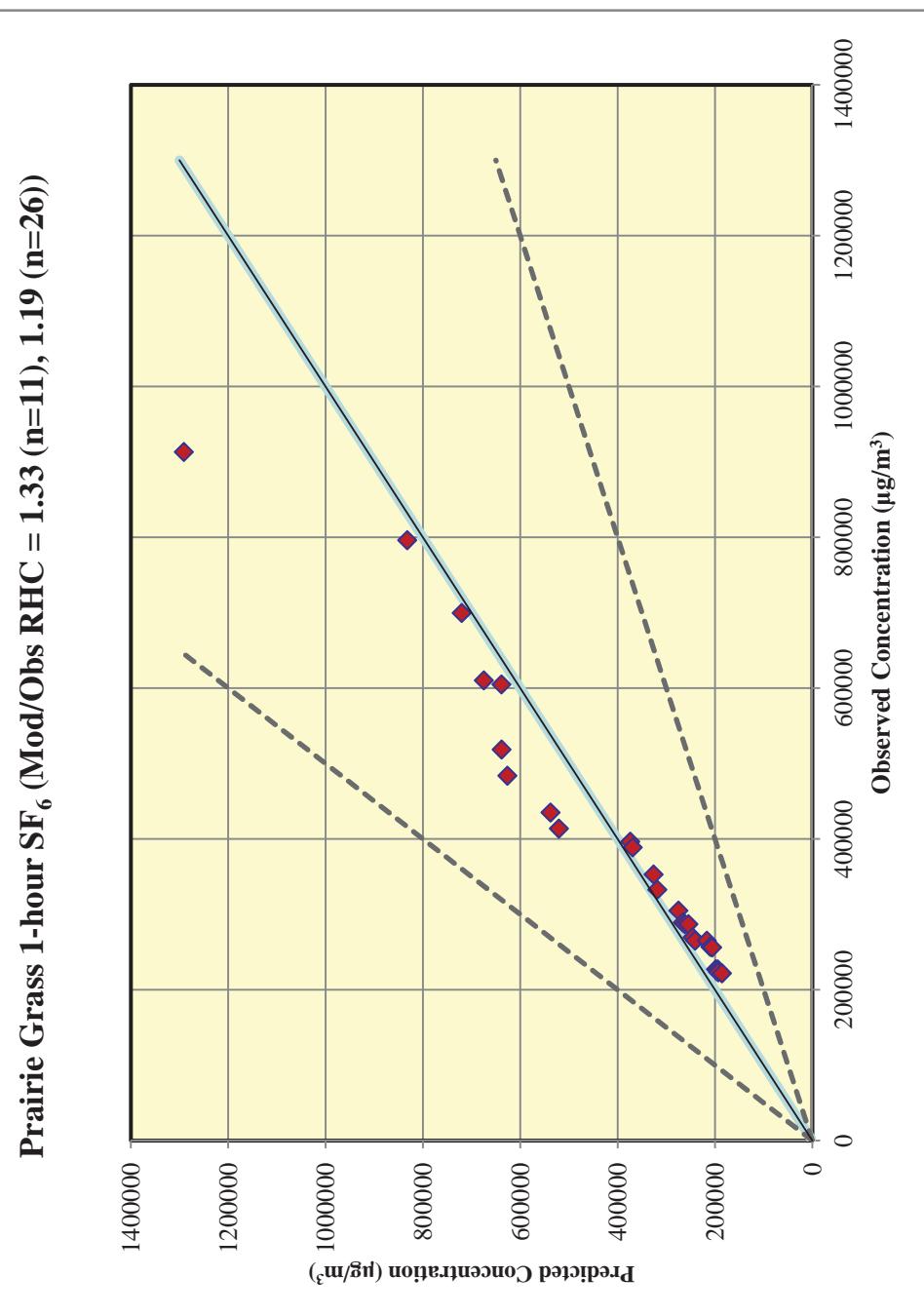
Tracy 1-Hour SF<sub>6</sub> (Mod/Obs RHC = 0.51 (n=11), 0.61 (n=26))



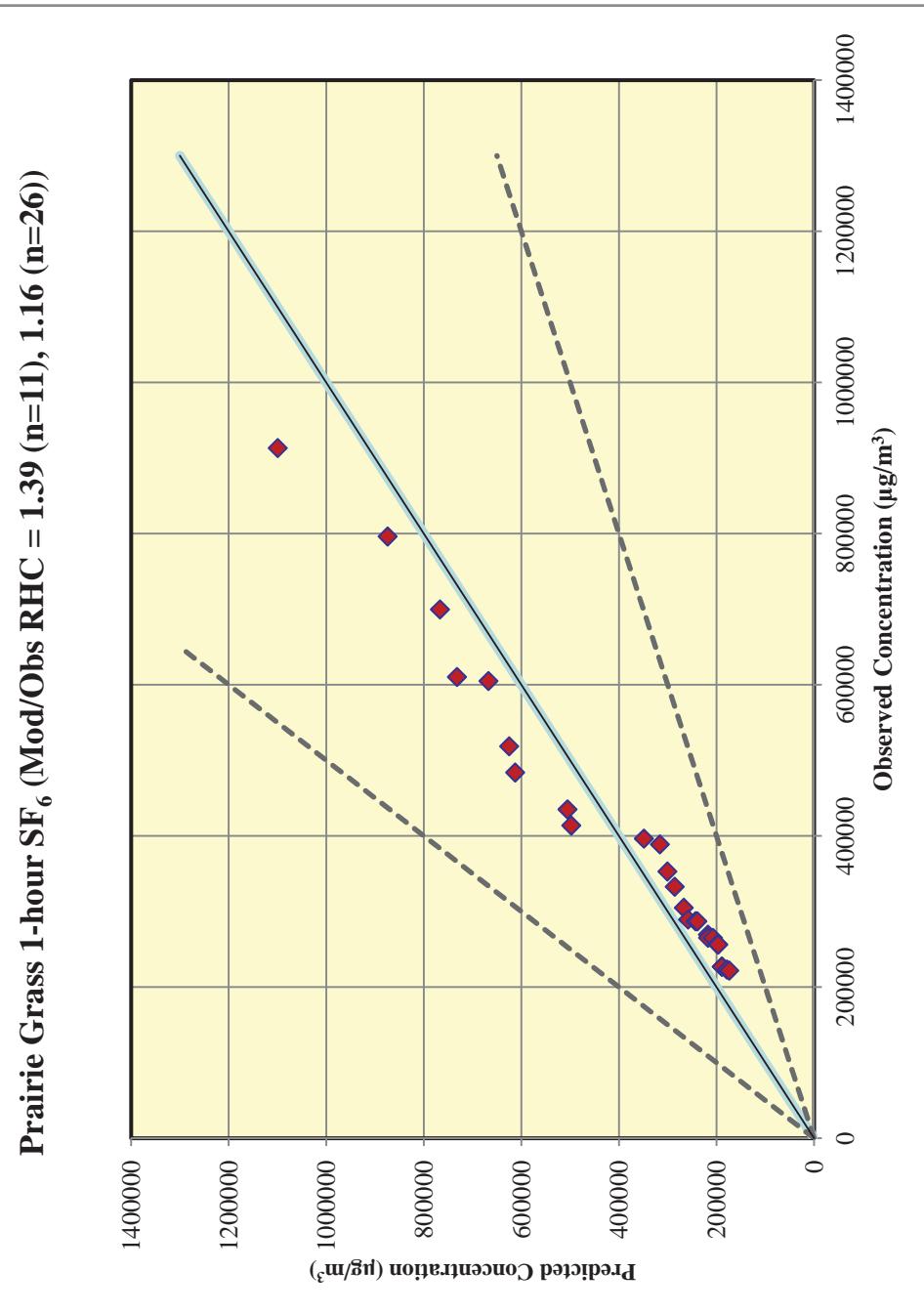
Attachment 5:

Quantile-Quantile Plots for Prairie Grass Tracer Evaluation

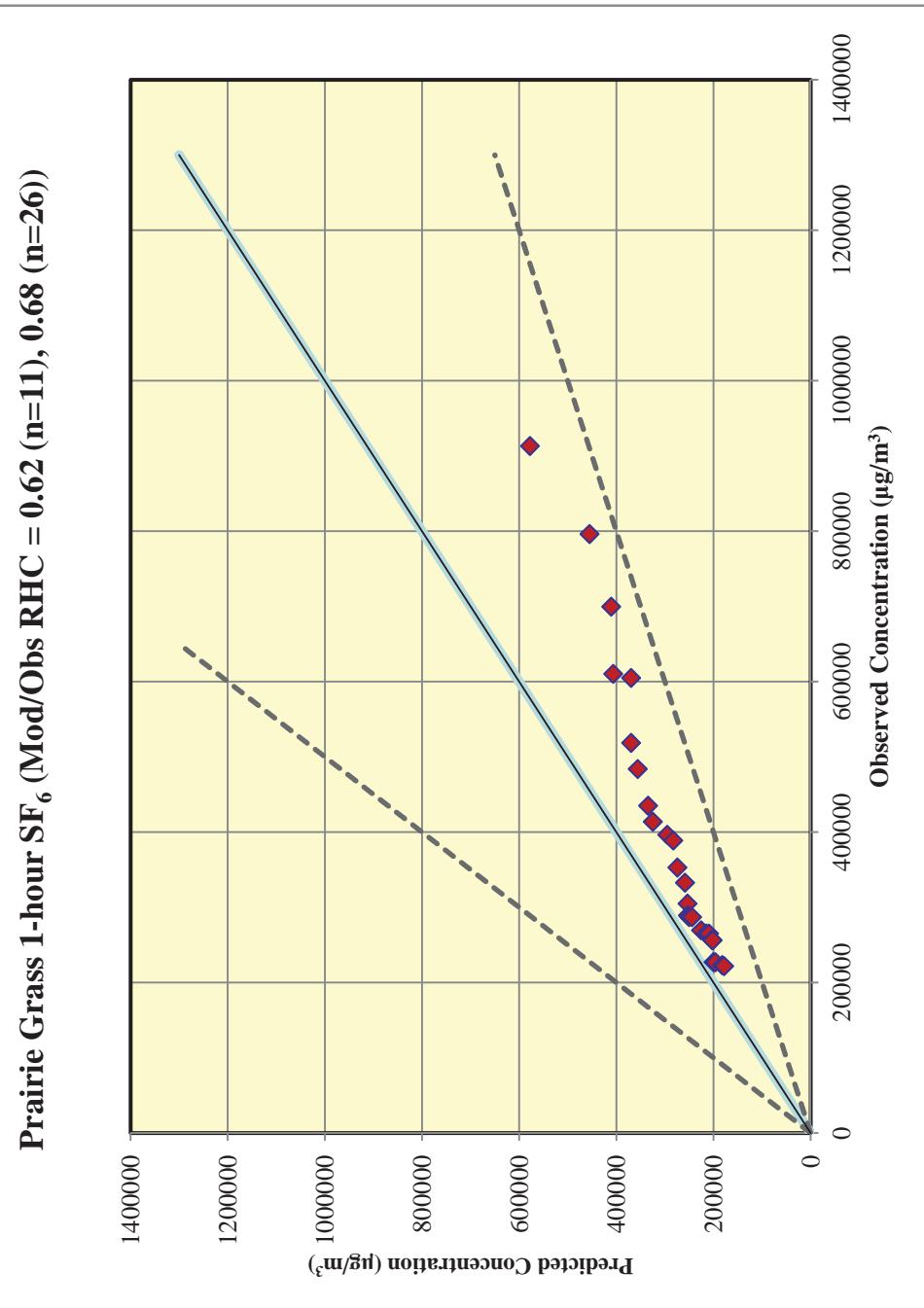
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 02222**



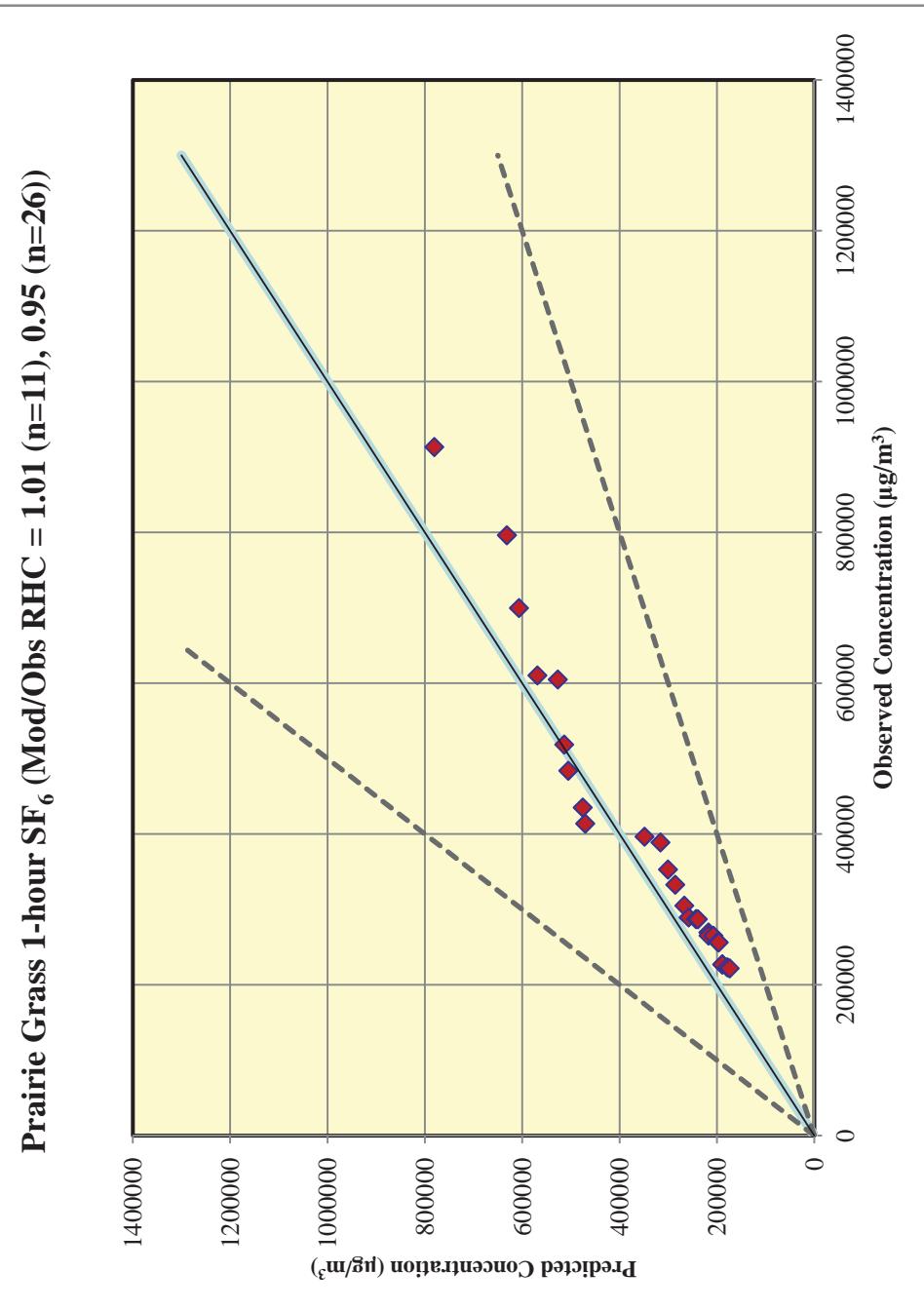
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345**



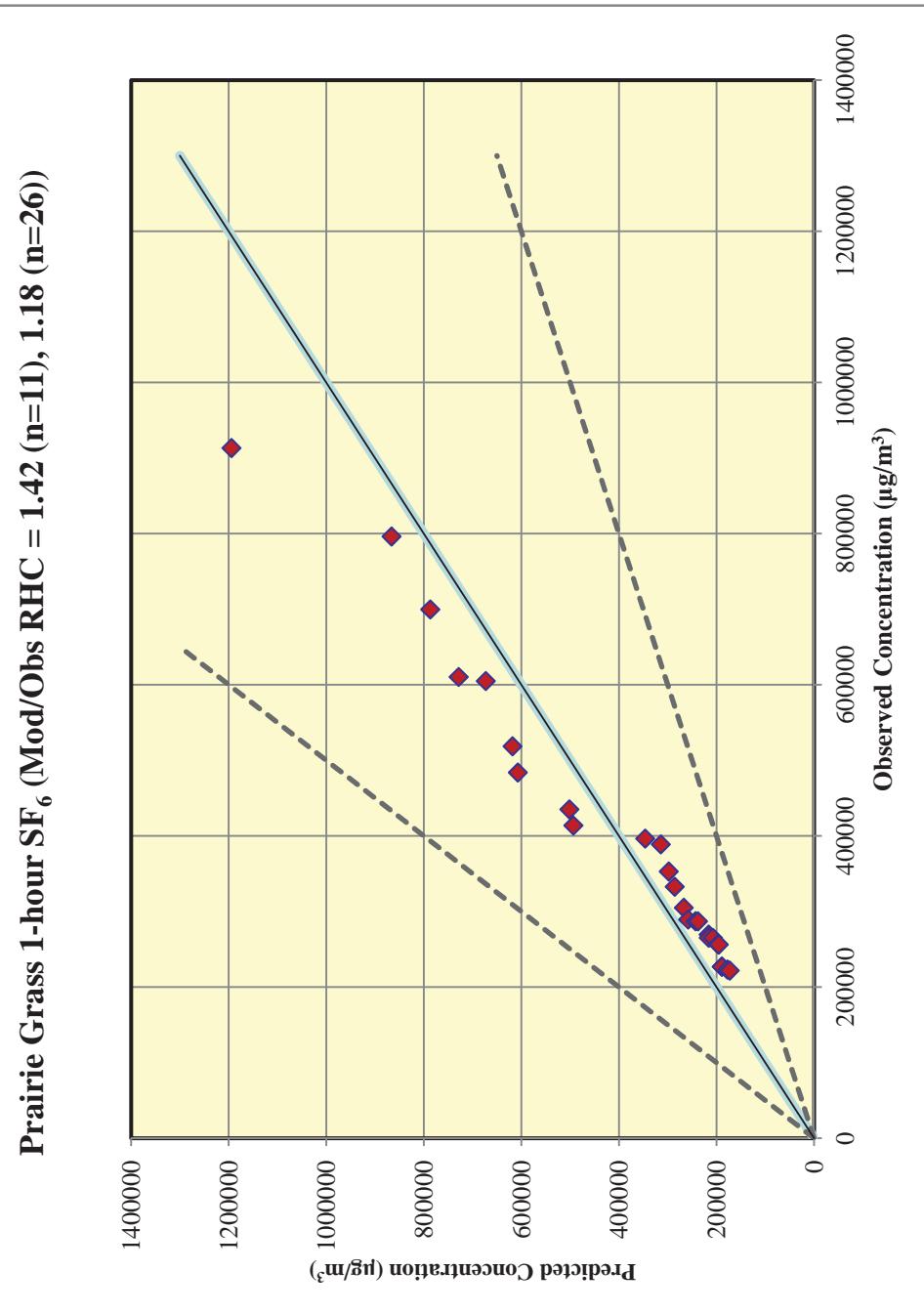
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND1 (0.5 0.5)**



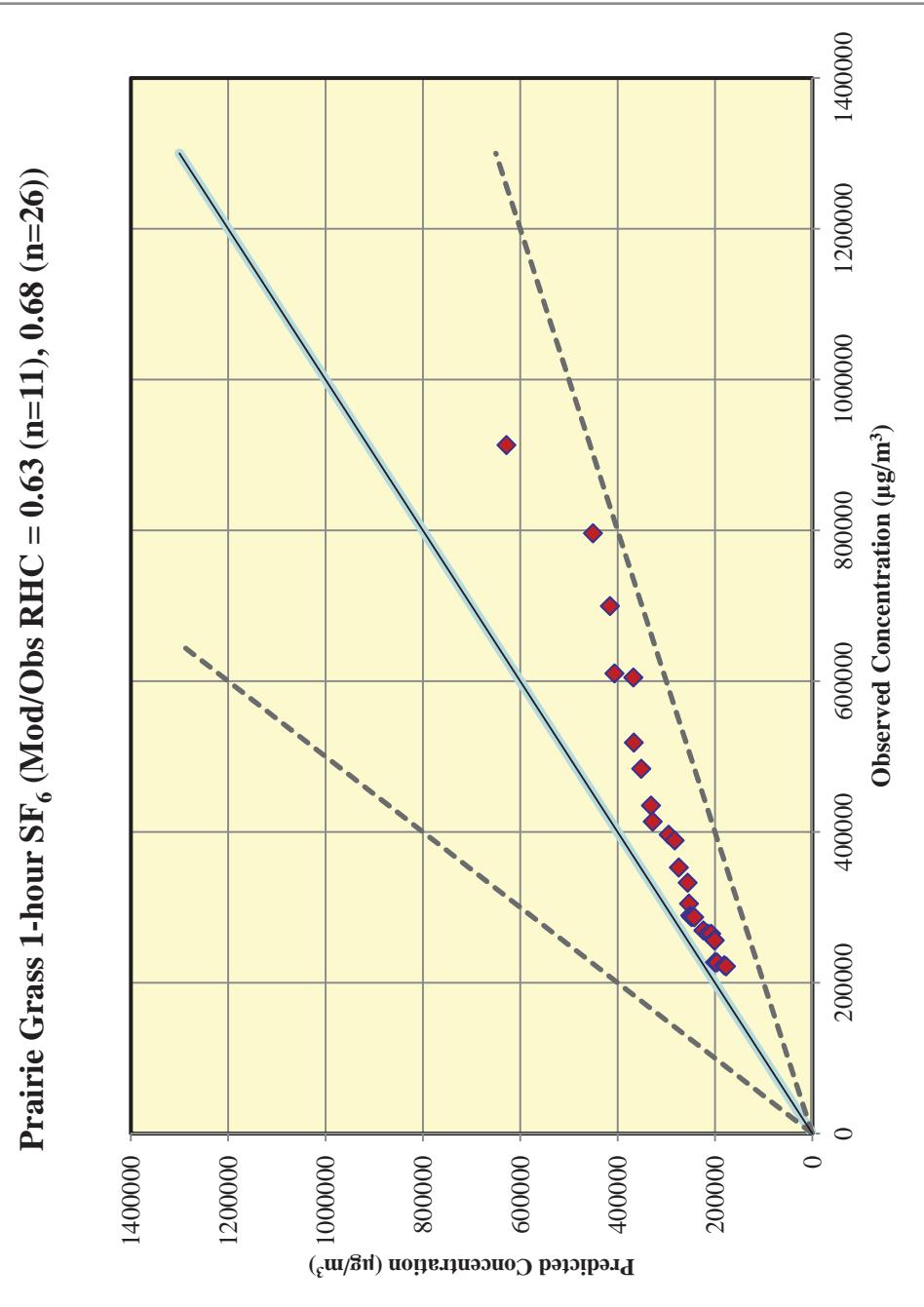
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta LOWWIND2 (0.3 0.5 0.95)**



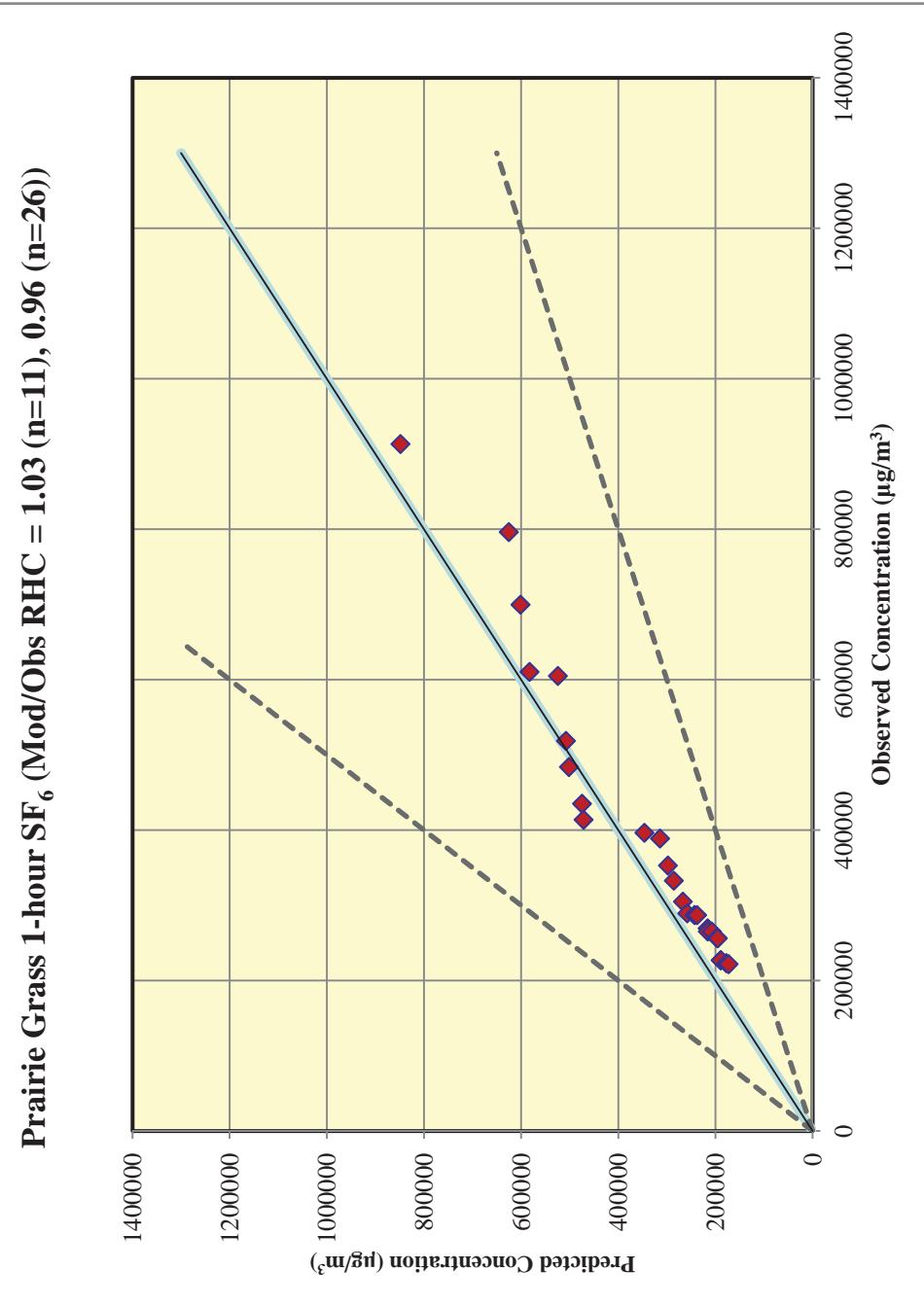
**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\***



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND1 (0.5 0.5)**



**Evaluation of 26 highest Modeled and Monitored Concentrations:  
AERMOD v. 12345, Beta ADJ\_U\*, LOWWIND2 (0.3 0.5 0.95)**



**Attachment 6:**

Homer City, PA EGU Analysis

# Homer City 1-hour SO<sub>2</sub> impacts at Homer Center High School using Allowable Emissions

